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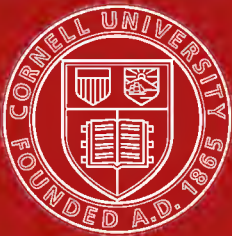
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NATIONAL EDUCATIONAL ASSOCIATION

Report of the Committee

ON

Industrial Education in Schools
for Rural Communities

TO THE

National Council of Education
July, 1905

PUBLISHED BY THE ASSOCIATION

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THE NATIONAL EDUCATIONAL ASSOCIATION

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REPORT OF THE COMMITTEE
ON
INDUSTRIAL EDUCATION IN SCHOOLS FOR
RURAL COMMUNITIES

To the National Council of Education:

The undersigned Committee on Industrial Education in Schools for Rural Communities, appointed at the meeting of the National Council of Education, Boston, Mass., July 9, 1903, has the honor to submit the following report on the subject assigned for its consideration.

The report proper is preceded by an introduction written by the chairman of the committee, giving a history of the formation of the committee, a brief statement of its plan of work, and its conclusions. The appendixes contain valuable matter related to the body of the report.

The Committee,	{	L. D. HARVEY, <i>Chairman</i>
		L. H. BAILEY,
		ALFRED BAYLISS,
		W. T. CARRINGTON,
		W. M. HAYS.

INTRODUCTION

To the National Council of Education:

The undersigned, chairman of the Committee on Industrial Education in Schools for Rural Communities, appointed at the meeting of the National Council of Education, Boston, Mass., July 9, 1903, respectfully submits the following report:

HISTORICAL STATEMENT

At a meeting of the Board of Directors of the National Educational Association on July 6, 1903, the following resolution was unanimously adopted:

Resolved, That the National Council of Education be requested by the Board of Directors of the National Educational Association to appoint a committee to report to that body, after such investigation as may seem desirable, conclusions as to what should be undertaken in the field of industrial education in schools for rural communities, and to recommend such an appropriation as may be necessary for carrying on the investigation and preparation of the report.

The resolution was transmitted to the Council and referred to its Committee on Investigations and Appropriations. That committee reported to the Council, July 8, the following recommendation:

With reference to the request of the Board of Directors that this committee report upon the expediency of undertaking an investigation in the field of industrial education

in schools for rural communities, we report that such an investigation seems to be urgently needed in view of the requests for information and advice that are reaching the school authorities in several states of the middle west. We recommend that the president of the Council be authorized to appoint a committee of five, consisting of active members of this Association, and of not more than one expert in agricultural education, who may or may not be a member of this Association, to undertake such an investigation and to report to the Council. We recommend that the Board of Directors be requested to appropriate \$500, or so much thereof as may be necessary, to defray the cost of the investigation to be conducted by such committee.

The report of the committee was unanimously adopted by the Council. The following resolution designed to carry into effect the recommendation of the committee was also unanimously adopted:

Resolved, That the Board of Directors of the National Educational Association be requested to appropriate \$500, or so much thereof as may be necessary, for a committee of five to investigate and report to the Council upon the subject of industrial education in schools for rural communities.

At a meeting of the Board of Directors, July 9, 1903, the recommendation and request of the Council were presented and approved and the appropriation asked for was made.

The President of the Council appointed the following committee July 9, 1903:

Superintendent L. D. Harvey, Menomonie, Wis., *Chairman*.

Professor L. H. Bailey, of Cornell University.

State Superintendent Alfred Bayliss, of Illinois.

State Superintendent W. T. Carrington, of Missouri.

Professor Willet M. Hays, of the University of Minnesota.

At the meeting of the Council in St. Louis, June 29, 1904, the Committee on Investigations and Appropriations submitted the following report and recommendation:

At the meeting of the Association, held in Boston in 1903, a committee was appointed to make a report upon the subject of industrial education in schools for rural communities. The sum of \$500 was appropriated for the use of this committee (see volume of *Proceedings*, pp. 36 and 37). It is expected that this committee will report at the next annual meeting of the Council. Of the original appropriation but \$187.95 has been expended. We recommend that the unexpended balance of the appropriation made one year ago for the use of this committee—namely, \$312.05—be reappropriated for its use during the fiscal year beginning July 1, 1904, and that, in addition thereto, the further sum of \$500 be appropriated to enable this committee to complete its investigation and report.

The report was adopted by the Council and a resolution passed requesting the Board of Directors to make the appropriation asked for.

At a meeting of the Board of Directors, June, 1904, the appropriation recommended by the Council was made.

WORK OF THE COMMITTEE

The committee has held four meetings. The first meeting was held in December, 1903, and was devoted to a consideration of the scope and character of the investigation and report to be made by the committee.

As a basis for this consideration, the chairman had at an early date sent to each of the other members, a suggestive outline of the work to be undertaken. As a result of this meeting a working plan was agreed upon for the general guidance of the committee as a whole, and fields of preliminary investigation were assigned to sub-committees.

It was agreed that the investigation should include the present status and the future possibilities of industrial work in the one-room rural schools, in the consolidated schools, in secondary schools such as now exist in rural communities, and also in secondary schools distinctively industrial in plan of organization, and that the scope and character of the report should be determined by the results of the investigations of the sub-committees.

The second meeting was held in February, 1904, for the purpose of hearing reports of the progress made by the sub-committees in their several fields of investigation, and for the discussion of these reports by the entire committee. As a result of this meeting

the general scope of the report was decided upon, together with the extent and character of the further investigation necessary for its preparation.

Some readjustment in the assignment of work to sub-committees was made. Each sub-committee was charged with making such further investigation of the subject assigned to it as seemed necessary, and with the preparation of a preliminary report upon the subject, to be submitted to the entire committee, at a subsequent meeting, for its consideration and for such modifications as might be decided upon.

SUB-COMMITTEES AND WORK ASSIGNED EACH

To L. H. Bailey and W. T. Carrington were assigned the subjects of nature study and instruction in the elements of agriculture in the one-room rural school.

To Alfred Bayliss, manual training and domestic art in the same class of schools, and also, agencies and forces outside the school which may be utilized in the interests of industrial education in rural communities.

To W. M. Hays, the consolidated school and the opportunities it may afford for industrial education.

To L. D. Harvey and W. M. Hays, industrial education in secondary schools for rural communities, including the distinctively industrial schools, the rural high school as it now exists, and the work in the consolidated school where it extends beyond the elementary course.

To L. D. Harvey, the why and what of industrial education for children in rural communities and the preparation of teachers to carry it on successfully.

The third meeting was held in December, 1904, at which time the work of the sub-committees, so far as it had been prepared, was gone over by the whole committee, and such modifications made as seemed necessary.

By formal action of the committee it was decided that each sub-committee should complete the work assigned to it as early as possible and forward it to the chairman, who was instructed to organize the reports of the sub-committees in form which the full report should finally take, and submit it for final action by the committee at a later date.

The last meeting of the committee was held in March, 1905. At this meeting the entire work was gone over, and the report, in substantially the form in which it is presented, was adopted as the report of the full committee.

CONCLUSIONS OF THE COMMITTEE

The general conclusions reached by the Committee may be summed up as follows:

First, that in existing one-room district schools a limited amount of nature study and work in the elements of agriculture, and hand work for both boys and girls may be undertaken; that in view of the quality of the teaching force available for these schools, the immaturity of the greater number of the pupils, the crowded condition of the program, and the lack of adequate supervision, but little can be expected in the way of industrial education in this class of schools; but where enthusiastic teachers qualified for the work, and pupils of sufficient maturity are brought together in the same school, something worth while may be accomplished, and that the effort for such accomplishment should certainly be made.

Second, that in the consolidated school having at least four teachers, one of whom is prepared to teach the elements of agriculture and manual training, and another domestic science, very much more in the field of industrial educa-

tion may be attempted than in the one-room school, and, with far better results. The committee believes this to be true, because in such schools teachers may be secured with far better qualifications than are possessed by most of the teachers in the one-room schools, and because in many cases pupils will remain for one or more years after completing the elementary school course, during which time the work in industrial education may be continued. In the consolidated school district, in most cases, new buildings must be erected. At small expense rooms may be provided for manual training and domestic science work, and a plot of land as a part of the school grounds set apart for illustrative and experimental work in agriculture. While the committee does not wish to enter into any argument in favor of consolidated schools for other reasons than for the facilities they may afford for industrial education, it wishes to endorse most heartily that portion of the report of the Committee of Twelve on Rural Schools concerning the advantages of the consolidated school.

Third, that in the township or other distinctively rural high school, and in the village high school attended by a considerable number of pupils from the country, a modification of courses of study should be made which shall provide for the introduction of work, especially in the elements of agriculture and domestic science, and such further lines of industrial education as local conditions may make feasible. To make this work a success, teachers must be secured who have made special preparation for it. For such schools a text-book treating botany from an agricultural and economic standpoint is greatly needed.

Fourth, that while the agricultural or industrial high school is found in but few localities, the character of the work already done in the existing schools of this class, the interest they awaken, and the hearty support they receive from the agricultural communities maintaining them, the history of these schools in foreign countries, the value of their work both for disciplinary and practical purposes, all combine to present the strongest reasons for the organization of schools of this type in large numbers, in agricultural communities. So thoroly is the committee convinced of the importance of industrial education in rural communities and what is essential for making this education effective, that in their opinion the establishment of secondary schools distinctively industrial in their character and of the type mentioned, is an absolute necessity for the proper development and organization of the rural school system.

Fifth, that the agricultural colleges and experiment stations have already done much in the formulation of a body of knowledge essential in the field of industrial education, but that more yet remains to be done in putting this body of knowledge into available form for use in elementary and secondary schools; and that effort in this direction should be made a prominent feature in the work of the agricultural colleges of the country.

Sixth, that the mastery of such parts of this rapidly developing body of

knowledge as is within the capabilities of elementary and secondary school pupils, furnishes a mental training unsurpassed in extent and quality by the mastery of any other body of knowledge now regarded as essential in our common school courses and requiring an equal amount of time; and that for utility value it is not equalled by any other body of knowledge at present acquired through the expenditure of the same amount of time and effort.

Seventh, that for the improvement of educational conditions in rural communities, the people in those communities must be educated to see and appreciate the possibilities and value of industrial education; that the value of this kind of education in increasing the productive capacity of those being educated is the argument which appeals most strongly to the rural population. Therefore, in the beginnings of industrial education in any community, immediate, practical results that will appeal directly to the interests of the people who support and maintain the schools must be made prominent by those concerned with its development.

Eighth, that the courses of study in rural schools should be framed with reference to meeting the needs of the children in those communities, and not with reference to preparing a small percentage of these children to enter higher schools whose courses of study are formulated, not to meet the needs of the great majority of those who attend them, but to prepare the remaining small minority to enter some still higher school.

Ninth, That it is possible and desirable so to organize the rural-school system as to present an articulated series of schools from the elementary school to and including the agricultural college, in which the work at every stage shall be planned and administered with reference to the needs of the pupils at that stage without the elimination of any valuable feature in the present school system, and without abridging in any way the opportunities for advancement of such pupils as wish to enter other schools of secondary or higher grades.

Tenth, that in industrial education, as in every other form, the success of the work depends upon the quality of the teaching; and that therefore, since effort for industrial education in elementary and secondary schools is comparatively recent and teachers have not prepared themselves in this field, special opportunities and inducements must be offered to the teaching force to make the necessary preparation.

Eleventh, that the organization of boys' and girls' clubs for definite industrial work outside the school, of clubs of farmers and of farmers' wives for the purpose of carrying on systematic reading courses in agriculture and household affairs, should be undertaken thru the co-operative effort of county and state superintendents and agricultural high schools and colleges, for the purpose of arousing a general interest in rural communities in the subject of industrial education. That the Patrons of Husbandry and farmers' institutes are potent forces in creating a demand for the introduction of the industrial phase of education into the rural school system, and that their influence

can be made still more effective by the establishment of working relations between their offices and workers and the school authorities.

Twelfth, that when teachers are unprepared to give instruction in the elements of agriculture and other phases of industrial effort, the work is likely to result in failure; that under existing conditions and under conditions likely to exist for a long time to-come, comparatively few teachers in the country schools will be prepared for this work. Therefore, any law making mandatory the teaching of the elements of agriculture, manual training, or domestic science in the entire body of rural schools within a state is unwise, in that the lack of correct information and consequent faulty teaching on the part of the great mass of country school teachers will tend to bring the whole subject into disrepute and cause a reaction which will postpone the proper development of industrial education. But while the committee advises against making mandatory the teaching of these subjects, it advises just as strongly that every effort be made for the proper preparation of country school teachers to begin this instruction, and that every encouragement and inducement be offered those prepared to undertake it, to introduce and carry it on in the schools under their charge.

L. D. HARVEY, *Chairman.*

THE ARGUMENT FOR INDUSTRIAL EDUCATION IN SCHOOLS FOR RURAL COMMUNITIES

The term "industrial education" has not as yet a well-settled, generally accepted meaning. It is sometimes applied to the training for skill in various technical operations to be employed later in the arts. Again the work of the trade school, where the chief aim is to develop skill in the processes of a given trade and little else demanded, is frequently spoken of as industrial education.

Too often the conception of industrial education sees in skillful manipulative processes of value to the individual, the chief end of such education and fails to recognize the extent and importance of the mental and moral training involved in securing this end.

While the difficulty in framing an adequate definition of so inclusive a term as industrial education is recognized, it seems necessary to offer such a definition as may be accepted for the purposes of this report. With this end in view, the following is presented:

Industrial education has for its purpose the acquiring of a body of usable knowledge of greater or less extent relating to industrial conditions, processes, and organization, and to the administration of affairs incident to the environment of the individual being educated, involving the gaining of some skill in the use of such knowledge, and the securing of mental, æsthetic, and ethical training through the acquisition and use of the knowledge indicated.

INDUSTRIAL CONDITIONS

The study at first hand of industrial conditions as they exist upon the farm, and in the relations of the farmer to those whom he supplies with the products of the farm and who in turn supply him with the things he needs and does not produce, affords opportunity for developing the power of observation and exercising the reason far beyond that afforded by a study of what others have written concerning these conditions, and is the necessary preliminary step for effectiveness in the latter form of study, in that it affords in the simplest and most natural way the apperceptive material necessary for the understanding of the verbal exposition and discussion of industrial conditions.

Such a study paves the way for an understanding of these conditions—of what in them is faulty; how far the farmer is responsible for the faulty conditions; what is essential for their improvement; how far their improvement demands co-operative as well as individual action, the character of that co-operation and the means necessary to secure it; how far their improvement demands governmental action, the character of that action, and the steps necessary to bring it about.

INDUSTRIAL PROCESSES

The study of industrial processes as employed upon the farm covers a wide range of activities incident to the housing, feeding, and clothing of the family; the treatment of the soil; the cultivation, harvesting, and the care of field crops; the care and treatment of domestic animals; and the marketing of the surplus animal and vegetable products of the farm. Such a study involves a comparison of the different processes employed for the same end by the same or different individuals; the results of processes; how far unsatisfactory results are due to the processes employed; what modification or substitution of processes is necessary to improve results with reasons for the changes; the adaptation, skillful use, and proper care of tools and implements used in the processes.

INDUSTRIAL ORGANIZATION

Successful industrial organization on the farm and among the farmers of a community requires a study of the adaptation of soil, climate, labor supply, and market, in determining the relative importance of stock raising and field crops and the varieties best suited to local conditions; the laying out of the farm with reference to production areas needed for and best suited to the various crops for a given year, involving the use of fertilizers, their varieties, cost, and supply, and the rotation of crops covering a number of years; co-operative efforts with other farmers for the purchase of supplies of various kinds, the preparation for market and the marketing of farm products.

ADMINISTRATION OF INDUSTRIAL AFFAIRS

In the study of the administration of affairs incident to the environment of the individual being trained, there is involved the whole question of the business management of the farm and the household, including a system of

farm and household accounting and the practical application of the knowledge and skill acquired through the study of local industrial conditions, processes, and organization.

Classes of Activities Required by Industrial Education.—In industrial education three classes of activities are brought into play. They are the mental, the moral, and the physical.

Industrial education, therefore, has to deal with the development and training of these three classes of activities, and utilizes as educational means the environment of the pupil and the affairs and industries of his region.

The educational effort employed in most systems of schools deals almost exclusively with mental and moral activities. Industrial education demands a place for the development of physical activities directed to useful ends, not regarded as necessary in other phases of educational work and thru the preparation for and exercise of these activities, furnishes mental and moral training unexcelled for the general development of the individual by any other form of educational effort requiring an equal amount of time. It is believed also that it gives, in addition to this general training, a practical knowledge and skill in dealing with the affairs of rural life—an added interest in the possibilities and advantages of that life—and that it will make the individual thus trained, and because of this training, a more efficient member of society in country or city than he would be as a result of training in the rural schools as at present organized and conducted.

In the educational effort which ignores the development and training of physical activities, the material employed in developing and training mental and moral activities is found chiefly in books. The immediate stimulus for such activities is the word upon the printed page. The word is the sign of an idea. The meaning of the word, and hence the character of the stimulus which it affords, are predetermined by the ideas existing in the mind of the reader, and therefore its effect in producing required activity is limited by the character of the ideas present in the mind at the time of the reading.

A verbal description or exposition of industrial conditions, processes, organization, and administration, and of their products, no matter how complete, systematic, and accurate it may be, fails to create in the mind of the listener or reader mental pictures as clear, accurate, and complete as result from personal observation and study of the things under consideration. These pictures are made still more accurate and complete when the individual himself enters into the study of the conditions with a view to suggesting plans for their improvement, masters the processes thru intelligent practice, or engages in the simplest work of organization and administration, and thus paves the way for the solution of their more complicated processes.

These mental pictures reach a still higher stage of clearness and become most permanently fixed in the mind when the individual, through the use of words, adequately sets forth the results of his observation, study, and activities as shown in the product of the processes employed, or in the improved conditions, organization, and administration of affairs.

The physical activities involved in industrial effort center chiefly in the hand, and until the stage of automatism is reached, they are guided and controlled by the active operations of the mind.

The people living upon the farm are engaged in industrial effort of various forms, and in most of these forms properly co-ordinated mental and physical activities are a necessity.

It is evident, with the definition given in mind, that industrial education is not all of education; that it may or may not have for its purpose the direct preparation of the pupil for the practice of a given art or process; that in any given school it may be the leading feature, or in fact, the sole feature; while on the other hand, it may simply be one feature and not the leading one; and that in any case its completeness is a relative matter.

Up to the present time, the work in the schools established in rural communities, both elementary and secondary, has been lacking in the elements of industrial training. The chief aim has been to acquire knowledge from books and to secure mental training thru the acquisition of that knowledge.

The *doing* demanded of the child has been almost entirely in the field of mental acquisition resulting chiefly from a study of what others have said and done, the use of pencil and pen furnishing about the only illustrations of *doing* requiring the use of the hand.

It will be seen from the definition that industrial education considered by itself or as a phase of our general educational system involves a line of training in doing which shall employ the hand much more fully than it is now employed by the demands of the public school; the acquisition of a body of knowledge relating to the things about the pupil not heretofore required; and a mental training, if not different, at least an enlargement of that now demanded, because it requires the mind to deal with things and physical processes as well as with words; and further, because of its dealing with things and processes characteristic of the environment of the individual, it will result in the development of interests not awakened thru the work of the public school as at present administered. These interests will be of value to the individual because of their vital connection with the things which are likely to actively concern him when the work of the school room is finished.

It is conceded by all students of education that the conditions in the country schools are not today what they should be for the proper preparation of country boys and girls for American citizenship. Briefly stated, these conditions are: poor, ill-kept, poorly furnished, inadequate school buildings with surroundings the most depressing; frequent changes of teachers, but infrequently for the better; irregular attendance of those enrolled; withdrawal from school at too early an age; inadequate supervision; schools too small to present conditions for successful work.

It is not intended to convey the impression that there are not rural schools well housed, with trained, experienced, progressive teachers, and with teaching equipment entirely adequate, nor that there are not some localities where

pupils attend with a reasonable degree of regularity for a reasonable number of years. But the number of such schools is not so large as it should be to leave us without a rural-school problem of the most vital importance.

Nearly one-half of the children in the United States who are in the public schools are enrolled in these rural schools. It is safe to say, taking the country at large, that more than 95 per cent. of the rural-school children attend no other than the district school. They are entitled to something better. The state is entitled to something better in the preparation of its youth for the duties of citizenship.

If the scope and character of instruction given in the rural schools are to be improved, we must first of all determine the causes for existing conditions responsible for the poor results obtained in these schools. Having determined the causes, we are then prepared to consider the means which must be employed to remove those causes.

It is the belief of the committee that the chief cause for all the evils above enumerated is the low educational ideals of the people in the rural communities. This cause exists because of the lack of a proper conception of what true education means, of what is possible in the field of industrial education for country children, and of its value to them. Lacking this conception, they fail to appreciate the necessity for keeping their children in school for a proper length of time and for making the proper expenditures to secure the essentials in teaching force, equipment, and supervision. This lack on the part of the rural population is largely due to the character of their education and to their environment.

While other causes than the one stated may seem to have operated to develop conditions interfering with the efficiency of the rural school, it is believed that all such causes may be reduced in the final analysis to the one stated. If this is the correct view, it follows that the problem of improving the rural schools resolves itself into the problem of elevating the educational ideals of the people in rural communities.

It cannot be denied that there are serious difficulties in the carrying out of this program, but something is gained when the point of attack is definitely determined. The isolation of the rural school and the rural family, their remoteness from centers of educational influence, introduce elements into the problem which do not exist when the improvement of the city schools is being considered. It is not enough to point out the shortcomings of the rural school; to present the conditions which stand in the way of its improvement; More than this must be done. The people in the country must be shown what must be done and, thru practical illustration what can be done to improve conditions. Constructive work of the highest order is needed.

Before higher ideals can be developed, there must come a knowledge of what is essential for better conditions—and by this knowledge, is meant not simply what students of the subject may understand and agree to be essential, but what the country people shall also understand and agree to be essential

conditions. When an individual is to be convinced as to the correctness of a proposition which sets forth something to be done and which he is to do, if it be done, it is essential to present it from a point of view which appeals to his own interests or to the interests of those with whom he is concerned.

Here is where industrial education enters the field. It is not easy today to even get an audience among the country people for the purpose of discussing before them the shortcomings of their schools and to present the necessity for their improvement, so long as no departure is made in our discussion from the lines of their past development and present organization. But the moment it is understood that we are to discuss the question of a change in the rural-school system which shall introduce a course of industrial training dealing with the elements of agriculture, with manual training, and domestic science, their attention is challenged and their interest awakened. Such a proposition appeals to them at once as having a practical utility which will increase the productive capacity of their children, better fitting them for earning a livelihood, and opening up to them such possibilities in life upon the farm as will induce more of them to remain in the country, rendering the attractions of the city less alluring than at present.

Show them the possibilities of instruction concerning the general plan of the farm and its scientific organization; the soil and its composition; the kind of soil needed for certain crops; the effect of raising year after year the same crop upon the same soil; the effect of rotation of crops; the proper mode of tillage; the treatment of worn-out soils; and the best modes of fertilizing soil for certain purposes. Indicate what may be done in instructing the children as to the plant life of the farm; varieties which may best be grown in the different localities for profit or pleasure; the modes of selecting, caring for, and improving varieties by proper breeding; the proper time and modes of planting; the most improved processes of cultivation; treatment to prevent the ravages of insects and other pests; and the proper mode of harvesting, caring for, and marketing the products of the farm. Outline the instruction which may profitably be given concerning the animal life of the farm, involving a knowledge of breeds and breeding; feeds and feeding, selection and care of stock designed for certain purposes, and the treatment of their diseases. Propose that their school shall teach a practical system of keeping farm and household accounts; that they shall give such instruction in manual training as shall make the boys acquainted with the common tools upon the farm and develop a reasonable skill in their use; as shall give them practical knowledge of the elements of blacksmithing; of the architecture of farm buildings; as shall afford their girls an opportunity to master the elements of domestic economy and something of the utilities and graces of home making.

When you have done this, you have interested those to whom you have addressed yourself; you have opened up to them possibilities in the instruction of their children of which they never had dreamed, or had simply dreamed of without realizing their possibility. You have presented to them what is

perhaps the most powerful argument which can be addressed to the ordinary human being—the dollar-and-cent argument.

In their view, grammar, geography, history, language, and even arithmetic fade into insignificance before the practical utility of this kind of training. You have presented to them something which appeals to their interest and which becomes a most powerful incentive to action on their part.

Make this the corner stone of your scheme for rebuilding the common school system, and you have the people with you. You have presented that which is knowledge to you. It has now become knowledge to them. You have laid the foundation for the development of better educational ideals, and upon it you may build your educational structure without the omission of a single valuable feature now found in the rural-school system. Nothing is lost and much is gained for the schools because you have gained the attention, the interest, the sympathy, and the support of the people who must maintain these schools.

It may appear that too much is claimed from the introduction of industrial education as a definite feature of rural-school work. It is not expected that this line of work can become a properly organized and co-ordinated part of the work in all rural schools at once, nor in fact that it can ever be developed to any considerable extent without a material modification and extension of the present plan of rural-school organization. Such a modification will come slowly at the best. Geographical and other conditions will make it impossible to effect any material modification for many years in certain localities. Its introduction to any considerable extent demands increased expenditure for teaching force and for equipment; and to secure the best results, the school life of the pupil must be extended thru a longer period than at present. This adds another element of cost in the education of the country child. Those who have had experience in attempting to induce farmers to increase taxes for any purpose will fully appreciate the necessity for the presentation of arguments that are so clear and conclusive, and appeal so strongly to the necessity of the persons to be reached, as to make clear that the failure to thus increase taxes involves an element of loss to the individual. The people who support the rural schools must be educated to a higher standard as to the needs of their children and the necessary changes in the work of their schools to meet these needs.

There has never been a time in the history of this country when the arguments for industrial education in rural communities could be presented with as great force as at the present time. At no time before have farmers ever stood facing such problems of industrial organization as they do today. Competition is no longer confined to the commercial world. The farmer finds himself face to face with the problem of competition with farmers in his own and other localities as never before. It is no longer a question of the man who can work the most hours and the hardest, but it is a question of the man who works most effectively, and he is the one who has been prepared for it

by a study of what is essential, a training in thinking and doing in dealing with these essentials, and who now puts the best thinking and doing into his work.

Is it possible that in almost every other line of human endeavor schools have been organized and are being carried on to train men for law, for the ministry, for engineering, in fact or almost every department of technical labor, and that there is no necessity for schools which shall specially train the farmer's boy and girl for their work upon the farm?

It may be said that it is not the business of the common schools to train mechanics, nor to train farmers. That perhaps may be conceded; but it is the business of the common schools to so train those attending them as to make them more effective and resourceful in whatever line of work they may enter. It is the business of the rural schools, which give a large majority of the rural-school population all the education they ever get in school, to definitely train these pupils with reference to their present environment; and this is reinforced by the fact that the major portion of these pupils, through the productive period of life will be concerned with the activities incident to country life.

For the limited number of country children who continue their education beyond what the rural-school system should offer, ample facilities are already provided in secondary schools and higher educational institutions, either public or private, offering general or technical training.

The present plan of organization of the common-school system seems to be upon the basis that its prime purpose is to prepare the pupils to enter the secondary schools; and that the prime purpose of the secondary schools is to prepare pupils to enter higher educational institutions.

It is time to change front in our plan of elementary and secondary-school organization. It is time to recognize the fact that a system of rural schools should plan its course of instruction with reference to the needs of the 95 per cent. of the pupils who attend them and who attend no other school, rather than with reference to the small remaining percentage who go on to a more advanced school. It is time to recognize that the present courses of study open to children in the rural schools, offering books as the only sources of knowledge and words as the only stimulus to mental activity, completely ignoring environment as a source of knowledge, a stimulus to thought, and an inspiration to action, are not the best for any who attend these schools, irrespective of whether they go from them to engage in their life work or continue their studies in other schools.

Preparation for life is a term often used, and in some quarters it is urged that the elementary and secondary schools should be planned to furnish such preparation. It should be recognized that the school is only one factor in the education of any individual; and that at best whatever preparation it affords for life must be partial—that it is a beginning—but it must not be forgotten that it is important that this preparation be well begun.

In discussing the question of the proper organization of the elementary and secondary schools, it is customary to admit that their courses of study should be framed with reference to the preparation of pupils for their life work rather than for advanced work in school. They are not so framed. In many influential educational centers it is admitted with equal readiness that the work in all schools designed to prepare for the next higher grade of schools is the very best possible preparation for life. Interested witnesses frequently make admissions which are not accepted by the court without corroborative evidence.

This committee does not hesitate to say that in its judgment the rural schools which train nearly one-half the school population of this country, so far as school training goes, should definitely recognize the fact that the major portion of those being trained will continue to live upon the farm; and that there should be specific, definite, technical training fitting them for the activities of farm life. Such schools will not make farmers nor housekeepers, but they will interest boys and girls in farming and housekeeping and the problems connected with these two important vocations. Work in such schools will make them intelligent upon the subjects pertaining to these vocations. It will train their thinking, and make it more effective in dealing with the problems growing out of these vocations, because during their school life a portion of their thinking is directed toward the solution of these problems. It will give such training of the hand as will enable both boys and girls to do more easily and effectively the things demanded to be done by these vocations, because it will offer them definite training in doing along related lines of activity.

The committee further believes, and does not hesitate to say, that a course of study framed with the ends in view here stated, furnishes a knowledge content of far greater value to the country child than courses of study as at present organized; and further, that the mental training involved in the mastery of the course of study as modified by the introduction of the industrial phases of education is of a higher order than that resulting from a mastery of the present courses of study. It is of a higher order, because it deals with a wider range of subjects; with a consideration of things in their relation to each other, to other things, and to the individual; with the development, modification, and adaptation of these things to serve the needs of man—and this largely thru physical doing, controlled and directed by mental activity to useful ends.

It may, and doubtless will, be claimed by many that the educational needs of the child are the same whether he is reared in the city or in the country, and determined without reference to whether his activities are to be employed in city or country after leaving school.

We may say that education demands, on the intellectual side, the development, control, and training for effective use of the varied activities of the mind, thru the action of stimuli of the right kind, properly applied at the right time. This, it is believed, may be laid down as universally true in

the educational processes. The work of the teacher, then, in the development, control, and training of the intellectual powers of the child is selecting the stimulus proper in kind and time, and thru right methods of applying it, securing the kind and amount of mental activity, properly directed, required to meet the needs of the pupil at a given time for given ends.

It will be apparent that in the field now under consideration—the intellectual side of education—the nature of the mind determines what is essential in the educational processes, and this without reference to environment. It will also be evident that the nature of the mind does not determine the choice of material available as the source of stimuli for various forms of mental activity and control.

Material may be employed as the source of stimuli to mental activity and be excellent for that purpose while having little or no other value. Other material may be employed of equal value for the same purpose and possessing further value of a high order as usable knowledge. It is believed that no one will take issue with the statement that whenever material of the latter kind can be employed that will fully meet the needs of the child by furnishing the proper stimuli for desired mental activities, it should be employed, and not be displaced by that material which has a value solely as a source of stimuli but without value as usable knowledge.

Material found on the printed page, if within the comprehension of the child, may be a source of stimuli for mental activity of a high order and of wide range, and it may have a knowledge value as well, but this is not the only material possessing such value. Material things about the pupil may be made to present stimuli for mental activity equally broad and equally necessary to the proper development of the individual. The mental activity necessary in determining, guiding, and controlling motor activity is a kind as important for the proper education of the child on the intellectual side as any which may result from the study of books; and for the individual whose life work is to demand the use of motor activities, it is of higher value than the mental activity of the same kind but which is not associated with motor activity, because it involves two co-ordinated forms of activity instead of one form not co-ordinated with any other.

The environment of the country child differs materially from that of the city child. Not all country children will remain in the country; few city bred children will remove from the city. The majority of those reared in either environment are likely to spend the greater portion of their lives within a similar environment. Therefore, it follows that in the education of the child, whatever of material things within his environment can be used as the source of appropriate stimuli for needed mental activities, should be so used. Whatever types of motor activity demand important mental activity for their initiative or control should be employed in the educative process if adapted to the child's stage of development; and if these types of motor activity are characteristic of the demands of environment, so much the better. If we add to this

the further statement that, when this material possesses a knowledge value of a high order to the individual, an added reason is furnished for its employment. These reasons make clear the statement that the educational needs of the country and the city boy are different, at least in so far as the use of material possessing a knowledge value is concerned and also in the use of material requiring motor activities.

STATEMENT OF THE CASE FOR INDUSTRIAL EDUCATION FOR RURAL COMMUNITIES

The case for industrial education is made up as follows: Physical and mental activities effectively directed to useful ends are a necessity for the farming population and also for the majority of mankind. Systematic direction and training are essential for the proper development and control of these activities. For the best results such training must come early in life, during the period when the child is properly found in the school. Such systematic direction and training are not now given during this period, and are not likely to be given outside of the school.

If the school is to fit the great majority of children in the country for life, it must fit them to deal with the things of their environment thru physical activities co-ordinated with mental and moral activities.

The committee believes that the training afforded by the mastery of a course of study which includes the industrial phase of education will broaden the outlook of pupils, and because of this wider view will open up and make attractive lines of work upon the farm which otherwise would not appeal to them; that it will develop self-dependence and moral stamina, thru sustained effort for worthy ends; and that for the boy or girl who does not remain upon the farm it is superior to the training offered thru the medium of the present course of study in the rural schools.

WHAT IN THE FIELD OF INDUSTRIAL EDUCATION SHOULD BE UNDERTAKEN IN SCHOOLS ADAPTED TO THE NEEDS OF RURAL COMMUNITIES

In attempting to state what should be attempted in industrial education in rural communities, it is not intended that everything here set forth shall be included in the industrial work attempted in any school or system of schools, but what from the standpoint of the Committee, may properly be incorporated in the elementary-and secondary-school work with such differentiation as may be necessary because of character of school, location, environment, character and extent of equipment, and quality of teaching force.

AGRICULTURE

GENERAL STATEMENT.—*In the field of agriculture, there may properly be demanded a knowledge of the elements of agricultural science, of good agricultural practice, and some skill in applying this knowledge.*

Without attempting to go into detail, it seems entirely reasonable to assume that within this field there may be included a treatment of the following subjects:

The Soil.

Plant Life.

Animal Life.

Economics of Agriculture.

In the elementary schools the work here outlined may profitably be preceded by a course in nature study. Such a course is presented in another place.

The Soil.—In dealing with the first topic, consideration should be given to its composition, modes of cultivation, fertilization, drainage, effect of rotation of crops upon the soil, means of restoring worn-out soil to condition of fertility, and the adaptation of different soils to different classes of products.

Plant Life.—Under the second topic, there should be a consideration of the various types of cultivated plants, including a knowledge of the best varieties for local cultivation, considering climate, soil, cost of raising; propagation, modes of growth; breeding; tillage; modes of harvesting, care for after harvesting, including selection and care of seeds; effect upon soil; economic values for marketing, for feeding, and for fertilization. It may be pertinent to inquire whether, for the boy who is to be a farmer, or for the girl who is to be a farmer's wife, and possibly for any other boy or girl, the botany of the corn plants, and the structure and modes of growth and reproduction of other forms of plant life on the farm, if properly taught, may not prove at least of as much value as the study of mosses, or other form of plant life upon which much time is now spent in the field of botanical instruction. This study would be for the country child a matter of practical utility, and would give him knowledge that would awaken an interest in the growth of agricultural products, resulting in more intelligent cultivation, better adaptation of crops to soil, and better financial returns.

Animal Life.—Treatment of the third topic should provide for a study of the domestic animals grown for pleasure or profit, including a knowledge of breeds and breeding; best varieties for certain purposes; feeding; judging; care, including the prevention and treatment of the diseases of domestic animals; preparation for marketing either the animals or their products; and such knowledge of animal pests, and of the modes of treatment for the prevention of their ravages, thus far discovered, as would enable the farmer to save many a crop which otherwise might be ruined. Again we may inquire, may not such knowledge be so organized as to be of at least as great value, both for knowledge and for training, as the study of the tadpole, the crayfish, and the angleworm?

The Economics of Agriculture.—In treating the fourth topic, study should be made of the relations of the farmers to local and general industrial and commercial organization; of the administration of the affairs of farm life,

including co-operative effort; and of a practical system of accounting for the purpose of enabling the farmer to determine with the same accuracy as the manufacturer does, the cost of any given product during any given period of time.

DOMESTIC ART, ECONOMY, AND SCIENCE

GENERAL STATEMENT.—*Within this field the scope of the work may embrace the acquiring of a knowledge of scientific principles and truths essential as a basis for the proper organization and administration of the activities of the household upon a scientific basis; of a knowledge of the facts, non-scientific in character, but necessary for the proper exercise of activities within the household upon an economic basis; practice in the application and use of this knowledge.*

In the accomplishment of the purpose set forth in the foregoing general statement, the following topics should be taken up in as much detail as conditions will permit:

Textile Fabrics.

Food materials and Food.

Household Economy and Management.

Science.

Textile fabrics for wearing apparel and for decorative purposes.—Work under this topic may involve instruction and practice in sewing, dressmaking, and the making of other articles of wearing apparel; millinery; a study of the quality of textile fabrics and their adaptation to certain uses and conditions; harmony of design, color, and material in clothing and for decorative home furnishing.

Food materials and food.—The proper treatment of this topic demands a study of food values, nutritive and economic; selection and care of food materials; preparation of foods, plain, invalid, and fancy cooking; serving of foods; equipment of dining room and kitchen, and care of dining room and kitchen utensils; practical work in laboratory, kitchen, and dining room, with a study of reasons for processes employed.

Household economy and management.—Under this topic the following subjects should be studied both from a theoretical and a practical standpoint: Furnishing and care of house; house sanitation; emergencies and home nursing; laundry work; true economy in marketing and in the management of household affairs; household accounts.

Science.—Under this head, such elementary work should be given in chemistry, biology, physics, physiology, and hygiene, as may aid in the mastery of the preceding topics.

MANUAL TRAINING

GENERAL STATEMENT.—*In the field of manual training considered apart from the work in domestic art, economy, and science, the following ends are sought: The training of physical, intellectual, and moral activities thru the*

use of tools and materials, together with such a practical knowledge of these tools and materials and their uses, as shall enable the boy to do very many things in the line of construction and repair work necessary upon the farm which would otherwise have to be done by hired labor at considerable expense.

The materials most valuable for this work in the class of schools under consideration are wood, iron, leather, and paint. The necessary tools for the ordinary work with these materials should be employed. Doubtless other materials and other tools may be used with profit. The character, variety, and extent of use both of tools and materials should be largely determined by local environment and industries.

CLASSES OF RURAL SCHOOLS

In considering the question of industrial education in schools for rural communities, it is necessary to consider the classes of schools now existing or which it may be desirable to organize to meet the educational needs of children living in the country. These schools may be classed as elementary and secondary.

Of the elementary schools, two types are to be considered: First, the one-room district school; second, the consolidated district school formed by uniting several one-room or two-room district schools into one consolidated school.

Of the secondary schools, four types may be considered: First, the consolidated school which offers in addition to the elementary course, one or more years of high-school work; second, the rural high school; third, the village high school with a large percentage of attendance from the country; fourth, the agricultural high school giving distinct lines of industrial work.

The consolidated school is now found in nearly or quite one-half of the states of the Union. In a large number of these schools no secondary work is attempted. In the others the secondary work covers a period ranging from a few months to four years, and is generally similar to that done in schools of the second and third types. The tendency seems to be to increase the amount of secondary work in these schools, but too frequently without a corresponding increase in the teaching force, or a modification of the course of study.

The second type, the rural high school, is found in a limited number of states. In some cases the township, in other cases a smaller territory, constitutes the district. These high schools as they exist today are rural, only in that they are located in the country. Their courses of study up to the present time have been practically the same as the courses of study in the city high schools.

The village high school is adapted to the needs of the country children only because it is convenient of access. Its course of study follows very closely the courses in the city high schools. For our purposes the rural high

school and the village high school may be regarded as belonging to the same class.

Two types of agricultural high schools are now in existence, the one comprising a single county within its district, and the other the state. Schools in each of these types aim to offer instruction in subjects which are distinctively industrial in character, not only in the field of agriculture but in manual training, domestic art, economy, and science, and in the organization and administration of farm and household affairs.

The county agricultural high school is organized to meet the needs of country children within the county, who are prepared through existing country schools to begin secondary work. Such a school centrally located in the county is easily accessible from all parts of the district. Many are able to attend regularly and live at home, while most of those who do not do so are able to go to their homes at the end of the school week, thus keeping expenses extremely low.

The cost of maintaining the school is borne by the county and state, the county paying one-third and the state two-thirds of the cost of maintenance in the case of the two schools of this class in Wisconsin. These two schools are a part of the public-school system of the state, and are the only ones of the kind in the United States.

The state agricultural high school is designed to meet the needs of the same class of pupils as the county schools, and the entire state constitutes the school district. The cost of its maintenance is borne by the state. The size of the district, with its greater wealth, makes it possible to furnish a complete equipment, a large teaching force, and to offer a greater variety of courses than the county schools. In these respects it presents somewhat greater advantages than the county school. These advantages are offset by the greater distances pupils are compelled to go to reach the school, and by its limited influence in remote sections, because of lack of immediate contact with the people at any considerable distance from it. The first school of this kind in the United States was organized in Minnesota. A few similar schools have since been organized in other states.

INDUSTRIAL EDUCATION IN THE ONE-ROOM RURAL SCHOOLS

AGRICULTURE

The attempt to give instruction in the elements of agriculture in the rural district schools has been made at different times in this country and in other countries. Up to date, the experiment has not been successful to any considerable degree thruout any great extent of territory. Here and there individual teachers have, under somewhat unusual conditions, succeeded to a reasonable degree, but generally the experiment has resulted in failure. It has been tried in France, in Ireland, in Canada, and here and there in other foreign countries over limited areas. France, Ireland, and Canada have all

abandoned the experiment because of its failure to meet expectations. It is now being undertaken again in Canada under somewhat unusual conditions, not thru governmental control but thru the philanthropy and public spirit of Sir William McDonald, who is personally paying the expenses of an experiment which is now being made, but which has not been continued long enough to warrant a definite conclusion as to its success. His plan involves the employment of men thoroly trained in agricultural science and practice to lay out a scheme of work in the elements of agriculture, each for a little group of either five or ten schools. Each instructor then organizes the work in agriculture for his group of schools, spends one day in each week, or one day in each two weeks, according to the size of the group, giving instruction in this subject and laying out the work for the teacher until he shall come again.

Even if this experiment shall prove successful under private support, it is questionable whether the expense involved in the administration of the plan may not be too great to render it feasible in a system of education supported solely by general taxation and where teachers are changed as frequently as with us.

Experiments of various kinds and varying in extent have been tried in different parts of this country, but no very great success has yet been reported. In each country where the experiment has failed, the authorities have reported that the chief reason was the failure to secure teachers properly prepared to teach the subject.

It is believed that all will concede that in this country that reason would have equal weight as applied to the force of country-school teachers. It is evident that before this phase of industrial education can be made a success in the one-room district schools, several things must be accomplished: first, there must be a body of teachers with special training for this work; second, pupils must remain longer in school; third, there must be a kind of work undertaken which shall be adapted to local conditions and limited to the capacity of pupils who are to take it; this involves a wise determination of what should be undertaken, in any given locality, both as to the scope and method.

To secure a body of better trained teachers, facilities must be offered for their training, which are not now in existence, and salaries must be materially increased. Parents must be led to see the necessity for pupils remaining longer in school. In many localities the length of the school year must be increased.

It does not seem feasible under existing conditions to attempt a wholesale introduction of this phase of industrial education in these schools.

INSTRUCTION IN AGRICULTURE SHOULD NOT BE MADE MANDATORY IN COUNTRY SCHOOLS HAVING BUT ONE TEACHER

To require by law that every country school teacher shall give instruction in the elements of agriculture is, in the judgment of the committee, a most serious mistake. It will simply result in another failure to be added to the

failures recorded in France, Ireland, and Canada. Such failures are likely to discourage further immediate efforts and prevent the present undertaking of what might otherwise be done.

Facilities should be provided for preparing teachers to begin this work; every inducement should be offered them to make such preparation, and they should be encouraged to undertake it where there are pupils old enough to profit by such instruction.

The committee is aware that its treatment of this phase of the subject is one which is not altogether pleasing to the popular fancy. It is a popular thing to talk of putting industrial education into the rural schools—and popular, doubtless, because its need is recognized—but a careful study of the outcome of what has been attempted thruout the world in this field will compel any man to reach the same conclusions as are here given.

Something in the line of nature study and in the elements of agriculture may be introduced by enthusiastic teachers who make intelligent preparation for undertaking it, but the character and scope of the work must be within the range of the pupils' powers and must have an educational value.

An outline of what may be attempted in nature study and agriculture under favorable conditions in these schools is given later in this report.

MANUAL TRAINING AND DOMESTIC ART

Here and there a teacher may be found who can give some elementary instruction in manual training in the district school, but the number of such teachers and the facilities for such work are limited, and great results cannot be expected.

For the beginnings of the work in carpentry, a five-dollar outfit containing fourteen standard tools may be had, and the small amount of lumber required may be obtained easily.

The school carpentry should keep in view the tools the boy will most probably have at home, and may well be directed to the making of articles which can be put to some immediate use at home or in the school.

If in the school there are a number of large boys, the carpentry may well expand within a year or two, so as to take in the enterprise of building a small shop on the school grounds and fitting it up for working purposes. Under specially favorable circumstances, it will not be difficult to extend it to the making of plans for the construction of farm buildings of the simpler sort.

With the right kind of a teacher, exercises may be given in the sewing of leather and in the splicing of ropes, finding practical application in the mending of harness, making of halters, etc., as the necessities of the farm may require.

Some practical lessons in painting and glazing may be given, and opportunities are not lacking for applying the knowledge thus gained, on the school or farm buildings.

In domestic art, with teachers properly trained (and they may perhaps secure training in some lines of this work more readily than in the other fields

of industrial education, especially in sewing) something might be done in almost every country school with the girls, provided wisdom is used in the way the work is organized and carried on.

REMARKS ON NATURE-STUDY TEACHING

It should be the object of all nature-study work to put the pupil into touch and sympathy with the natural world in which he lives, and to use the objects and phenomena in this environment as a means of education. Every effort should be made, therefore, to give the pupil a correct mental and spiritual picture of his surroundings in their entirety, rather than to train him merely in certain unrelated objects or parts taken out of his surroundings. Of course, the pupil must be set at specific objects, but this is only because these objects should be studied in their relationships. It is not enough merely to study a leaf or a bird—these are only parts of the life of the neighborhood and the study of them should lead out to plants and birds and fields. Nature study constantly takes the pupil out from the schoolhouse into the larger school of Nature; and it keeps him in touch with the out-of-doors the whole year round.

The best nature-study lesson is that which has relation to something normal or native to the environment. The kind of tree that grows in the school yard or along the road, the birds that frequent the school yard and adjacent fields, the brook, the hills, the character of the soil, any unusual or striking feature in the neighborhood—all these are proper subjects for nature-study work. Some of these subjects can be brought into all the grades. There is such a great variety of subjects in the environment, that it is difficult to choose any list that is better than another or that will apply to all parts of the country. The following lists comprise subjects that will be found to be useful and teachable. It is not expected that all these subjects be taught in any one year or one grade. Perhaps nine subjects in each grade will be sufficient, one subject continuing for a month. This will allow some degree of thoroness with the work, but will not keep the subject before the pupils so long as to make them tired of it. It is assumed that not more than one or two periods a week would be devoted to these subjects.

The work in nature study should be simple, definite, accurate, and, above all, have relation to the lives of the children. Nature study should be clearly distinguished from object-lesson teaching; for object-lesson teaching nearly always takes the object out of the environment and therefore trains only the observation powers. Object-lesson teaching with natural history subjects is not nature study.

The teacher should avoid the giving of mere information and the holding of the old-time kind of recitation. The teacher must remember that the recitation is a re-telling, that is, a re-citing; the child tells the teacher what the teacher or book has previously told to the child. In fact, the teacher asks what the child remembers. Nature study teaching should proceed on the principle of questioning the children for the purpose of asking the child what

he has found out, or what his own point of view is, or how his work may be improved. Some information must be given for the purpose of starting the pupil off and awakening his interest; but information-teaching with nature subjects is not nature study.

Observation work should always be accurate. It is not to be understood, however, that accuracy means completeness. We are always in danger of giving the children the complete experience of grown-ups rather than the incomplete experience of themselves. It is not necessary, for example, to study the leaf in all its functions and all its structures at one time for the purpose of being able to say that the pupils have completed leaf study. The leaf should be studied because it is a part of the tree and has work to do. So far as possible, all nature-study work should begin with the functions, at least with the natural relations of the objects to their environment.

It is always desirable to have the pupils feel that the nature-study work lies out of doors rather than in doors. The work is brought inside only when it can be better done in the schoolhouse. The excursion, therefore, becomes a very important part of nature-study work. However, the general promiscuous excursion-going may be too indefinite and discursive to be anything more than a recreation; therefore the excursion should be planned for some definite object. Tell the pupils the general line of inquiry they are to make—to see a maple tree, to watch the fish in the brook, to examine the lichens on the rocks, to discuss the weeds in a fence corner, to watch the cows feeding, to discover the habits of a particular bird. Make the excursion short, definite, and for a purpose.

In nature-study work in the earlier grades, the children should not be conscious that they are studying "science," although all the work should be scientific in the sense that it is accurate and definite so far as it is possible within the limitations of the child.

There are three main elements in the out-of-doors: earth and sky and scenery; the plant population; the animal population. Any good nature study will reveal all of these to the pupil.

In order to study these to best advantage, the pupil should have a laboratory, in which the objects and phenomena may be under some control, be near at hand, and in which all the work may be concreted. This laboratory is the school garden. A considerable part of manual training, as well as nature study, may be associated with the school garden. All the handicraft of the garden is manual training—the making and repairing and cleaning of tools; the building of tool boxes or sheds; the making of bird-houses; the construction of fences and paths; making of labels; painting of tools and buildings.

Scheme for Nature Study in School Years 1 to 5

Following is a general outline or ground plan for work in nature study. It is exceedingly difficult to adapt nature-study work to school routine, because nature has no definite schedule and the subjects that the pupil must take up,

if he is to come into essential relation with the out-of-doors, are numerous and of very many kinds. However, it is possible to classify these subjects, thereby throwing them into an orderly arrangement and providing for a continuity of work. The work should be progressive, one year leading to another year, because the child's horizon and capabilities are enlarging year by year. When the child has once traversed a subject, he should not be asked to go over the same work again in subsequent years.

A syllabus that is merely a list of subjects is of very little value to the great majority of teachers. There is no inspiration in it and in the absence of direct suggestions of ways and means, the teacher is likely to lay it aside. All such syllabi, therefore, should be supplemented by hints to teachers; and the constant refrain in these hints should be suggestions as to how to get the pupil out of doors and into actual work.

The teacher must not suppose that all of these various lessons or subjects mentioned in the following scheme are to be given simultaneously, as the schedule would seem to indicate. The scheme merely suggests what appear to be useful subjects and tries to present a natural sequence. If the teacher is working with the animal group, for example, all three of the "purposes" will be proceeding at once and will constitute one homogeneous subject, one day emphasis being put on one phase and another day on another phase. Probably no teacher will be able to cover all the subjects. The scheme presents enough subjects to enable the resourceful teacher to choose the work of the year, devoting to it one period or more a week. In choosing the subjects, the teacher must always be careful to construct such a sequence as will put the pupil into first-hand touch with the general pageant of the out-door world.

The teacher should have a clear conception of the purpose of any lesson or of any line of effort. In the following syllabus, the purposes of the different pieces of work are stated at the outset, and a similar classification is carried down into the details of the work. These categories, however, do not represent distinct "studies" so much as different ways of looking at the general subject. For example, under "Earth and Sky" are divisions of the weather and of natural events. Very often these two subjects will be taught in one and the same lesson; but the teacher should always have clearly in mind that he is to interest the pupils in the weather as weather, and also in the progress of the seasons. Again, while the three categories under "Plants" may all be proceeding at the same time in certain cases, the teacher should know that there are at least these three general purposes to be kept in mind—to teach the plant population of the neighborhood, the way in which plants live, the particular habits and marks of special plants or parts of plants.

The committee does not intend to make a complete working syllabus on nature study, since this would be quite impossible for the entire United States; nor is it the province of the committee to enter into school details. The following is an outline or framework which will serve to define nature-study work, and to suggest the kinds of subjects that may be profitably undertaken.

I. EARTH AND SKY

There are four leading categories in this group: (1) the weather; (2) the natural events of the year; (3) the conformation of the surrounding country; (4) survey of a brook or other strong natural feature of the region.

1. *The weather*.—First year: The child should observe and tell what the weather is, and should begin to learn to be weatherwise and to know the "signs" of the weather. Second year: Clouds, sunshine and shadow, both indoors and outdoors; sun-dial. Third year: Wind; making and flying kites; weather vanes; chimney hoods; effect of wind on shape of trees; begin weather record, perhaps as blackboard exercise. Fourth year: Temperature; begin thermometer readings; continue record, perhaps in notebook. Fifth year: Barometer; weather maps, signals and forecasts.

2. *Events of the year*.—First year: Note the change of seasons; position of the sun at different seasons; holidays. Second year: Begin seasonal observations, chiefly on date of appearing of frogs, migrations of birds, etc. Third year: The calendar; continue observations, chiefly on trees, fruit trees, etc.; begin a record, perhaps on blackboard. Fourth year: Continue observations, taking up the farming industries if in the country; times of plowing, tilling, sowing, harvesting, wood-hauling, fence-building, etc.; making a diary of work in the community.

3. *Scenery, or conformation of region*.—Second year: General observations as to contour of country, perhaps as seen from school room windows. Third year: More detailed observations, classifying into swamps, hills, flats, woodlands, river-beds, orchards, grazing lands, etc. Fourth year: Describe the scenery in oral and written work; how the scenery can be improved. Fifth year: Observations on a particular area, one farm, the school yard, the main road, etc.; make charts and drawings.

4. *Survey*.—Third year: Begin a regular "survey" of a brook or other prominent natural feature of the region; it is better if the feature is near the school house; the first work will be chiefly exploration. Fourth year: Continue survey; begin to take definite measurements of the brook, width, depth, length, tributaries, pools, etc. Fifth year: Continue; describe the brook; make charts; determine the drainage basin and how the brook affects its region.

II. ANIMALS

The purposes of the animal work are chiefly three: (1) to determine the animal population of the region; (2) to discover how the animals are related to their environment (ecology); (3) to study particular animals or groups of animals.

1. *Population*.—First year: How many kinds of mammals, birds, insects, etc., does the child know? let the child be kept on the lookout; train his observation; always include the farm animals within the scope of the observation. Second year: Carry the observation further, with birds. Third year: Further with mammals. Fourth year: Further with fish, frogs, salamanders, etc.; aquarium. Fifth year: Insects; terrarium.

2. *Relations*.—Second year: Where do the different birds live? what do they eat? nesting habits; classify as to habitats. Third year: Same with mammals. Fourth year: Same with fish, etc. Fifth year: Same with insects.

3. *Particular animals*.—First year: Canary; cat. Second year: Robin; chicken rabbit; dog; woolly bear; goldfish. Third year: Pigeon or dove; house or English sparrow; frog; turtle; cow; tent caterpillar or cabbage butterfly. Fourth year: Bluebird; blackbird; crow; toad; squirrel and chipmunk; horse and mule; mouse; cricket. Fifth year: Poultry; salamanders; fish; water insects; moths and butterflies; sheep and goat; pigs; woodpeckers, thrushes, warblers, sparrows and other bird groups.

III. PLANTS

The purposes of plant work are similar to those of animal work: (1) to determine the plant population of the region; (2) plant relations (ecology); (3) particular plants and parts of plants.

1. *Population*.—First year: Plant population, as for animals. Second year: Observations with garden flowers and vegetables. Third year: Wild flowers; preservation of the wild flowers. Fourth year: Continue with bushes. Fifth year: Continue, with trees.

2. *Relations*.—Second year: As with animals; habitats, etc., particularly with garden plants; distribution of seeds will be an incident in this and succeeding years. Third year: Continue, with wild flowers and weeds. Fourth year: Same with bushes. Fifth year: Same with trees; plant population of hills, swamps, open fields, etc.

3. *Particular plants and parts of plants*.—Second year: Leaves; roots; flowers; seeds; fruits; some common vegetable or grain; strawberry. Third year: Hepatica, trillium, spring beauty, arbutus, or other early spring flowers; pussywillow; dandelion; sod and grass; morning glory; ferns; sweet pea; daisy; asters; goldenrod; Fourth year: Lilac; rose; elder; willows; snowball; sumac; hawthorn; blackberries; raspberries; currants and gooseberries; virginia creeper; grape vine. Fifth year: Evergreens; elms; maples; oaks; ashes; hickories and other nut trees; fruit trees.

IV. SCHOOL GARDENS

The purposes of school garden work may be thrown into three general divisions: (1) to make garden and acquire skill with tools (handicraft); (2) to learn how plants grow and behave under cultivation; (3) to discover what transpired in the garden.

1. *Handicraft*.—First year: Simplest garden operations, as raking, sowing seeds, watering, shading, etc. Subsequent years: The garden work will naturally continue itself, and new problems will come into the horizon of the pupil as soon as he is ready for them. Such questions as staking, tying, thinning, transplanting, planting a bush or tree, distinguishing weeds, kinds of soil, and fertilizing will come up as the work proceeds. In all years, window gardens and plant boxes may be a regular part of the school garden work.

2. *How plants grow*.—Second year: Germination; seed leaves. Third year: Seed testing; layers; bulbs. Fourth year: Identification of kinds of seeds; cuttings. Fifth year: How different kinds of plants grow and behave; grafting; pruning.

3. *Record*.—Third and subsequent years: A garden record may be begun, at first probably as a blackboard exercise. Each garden worker in fourth year should have a note-book.

SUGGESTIONS ON MEANS OF WORKING OUT THE NATURE-STUDY OUTLINE

In the absence of any recognized system or method of handling nature-study work, the committee thinks it desirable to present a few definite lessons to illustrate why and how the work may be taken up. These are not meant to be model lessons, but only suggestions as to point of view, purpose, and method. Inasmuch as the very purpose of nature study is to relate the pupil to his environment, the ways and means must be modified with the environment. This is why nature study is considered by many persons to be so difficult to teach—the teaching is almost wholly the expression of the individual teacher.

ILLUSTRATIVE LESSONS ON EARTH AND SKY

I. FIRST AND SECOND GRADES: SUNSHINE AND SHADOW

Purpose of the lesson.—To help little folks to be "weather-wise," and to put them into sympathy with the weather.

The lesson.—It will be of more value to children in the first and second grades to note the conditions associated with storm and sunshine than to take part in keeping a record of them. The most important result is that they shall get into the habit of noticing the weather and the out-of-door changes resulting from it.

There will be the sunny day. Little children can be led to take an interest in the sunlight and to notice what it means in the out-of-doors. There are many ways of bringing about an interest in the sunshine that will suggest themselves to teachers. One way is to note the things that the sunlight reveals. There are the shadows, and every little child is interested in them. There is his own, sometimes large and sometimes small; sometimes he can find it and again it is not there; the shadows of the trees and where they fall at different times; the shadows cast by the current bushes; the shadows cast by the asters and golden rod; the shadows at different times of the day.

Then the sunny day will bring the reflections in the brook: his own round face; the trees and the water plants; the shadows made by the little water striders skipping over the surface—the range of his world mirrored there. These he can see and these things he will care for. Thru them he touches his environment.

Another line of suggestion for lessons on weather may be found in the clouds. There are times during the school days when the sky is blue and the great white clouds are crossing it. Let the children go out into the yard with you for a few minutes and watch them. Let them talk about the clouds; let them notice the small ones and the large ones; let them tell you whether all are of the same color. What happens when one of these great clouds covers the sun? What are the differences in the shadows then? Will the rain come soon?

In these grades, the sun-dial and shadow-stick can be introduced; and if there is manual training in the school, these devices may be made by the pupils.

It will be a good thing to teach the children to enjoy a gray day. A few minutes in the school yard under a gray sky will lay the foundation for this. What does the long, gray day foretell? And the autumn skies with their wonderful cloud effects? Can you not spare a little time from the routine of school work to stand beneath them, and to encourage the little folks to see them?

Children often hear the expression, "It is going to rain," or "It is going to snow." On such days, have a little outdoor experience with the weather. How does the air feel? Is the wind blowing? Which way do you turn to feel the wind in your face?

The children will soon come to name the kinds of days—hot days, cool days, bright sunny days, dull sunny days, bright gray days, dark days, gusty days, rainy days.

II. THIRD GRADE: A RAIN STORM

Purpose of the lesson.—(1) To put the pupil in the right attitude toward weather. (2) To interest the pupil in the changes to be seen in the out-of-doors after a storm; to lay foundations for geography lessons.

The lesson.—Although discussion of a rain storm may take place profitably in the first and second grades, the best time for continued observation will be the third year in school. Then the pupils are ready to do some independent observing and they can seek certain definite results of the storm.

The spring shower comes up suddenly; the room darkens and the children cannot see to work. This is the time to have them feel the part that the rain storm takes in their lives. It will be restful to lay all books aside, to clear the desks and study the shower. Can the rain be heard on the roof? How cheery it sounds! With closed eyes, you know that the drops are coming down thick and fast. Let us go to the windows. It is interesting to watch the water dash against the panes and roll down; to see it falling on the trees and flowers; to think what it means to the fields. How fast the streams flow in the gutters and ruts in the road! Why? How muddy the rills and rivulets are! Why? Where are the birds? What a good time Robin is having out there in the rain! Do you suppose the squirrel dislikes the rain? Do the wild animals run for cover? Are the cows and horses in the fields in a hurry to seek shelter from the storm?

The nature of the rain itself should be noted: Drops large or small? Very numerous or relatively few on the pane? Does the rain fall straight down or does it come slanting?

Does it strike hard? Does it seem to come from a great height, or are the clouds low? Let the first few drops strike on a clean piece of glass, then dry the glass. Is the glass soiled? Why? Catch some of the last drops in the same way.

It frequently happens that the spring showers are heavy and brief. They cease before the close of school. The wise teacher will go out with the children to see the results of the storm. If her class is large, she can limit the observations to one or two definite things, as, for instance, the flowing of the water, making tiny valleys and carrying the waste material; but if there is time, she may take this opportunity for teaching some of the land and water forms, for after a shower these are present in miniature and are best taught afield. If the class is large, preparation for this lesson can be made by means of sand and clay maps, and then the children may be told what kinds of things to seek before leaving the school house. Young people enjoy a particular quest. Who will be the first to find an island, a peninsula, a lake, a mountain, a valley, a delta, a mountain range? Then will come the question, How are these land and water forms made?

III. FOURTH GRADE: SCENERY

Purpose of the lesson.—To familiarize pupils with the scenery about their homes and school. To lead them to think of ways to protect the natural beauties of the surrounding country. To suggest improvements.

The lesson.—With large classes, it is very difficult to conduct field trips. Every teacher, however, can have one or two afternoons out of doors with her pupils, and much can be accomplished in this time. These afternoons will stand out strongly in the lives of the children thru all the coming years.

If there is a height of land in the vicinity of the school, let this be the place to which the field trips will lead. Before leaving the school house, test the children's knowledge as to what can be seen from the hill. Then ask them to take note-books and make a list of objects that will be valuable later in preparing a full description of the scenery.

An occasional suggestion from the teacher will start the pupil on a new line of thought. The following might be considered:

1. The natural features of the region: mountains, hills, lake, river, creek, etc. Which features give the character to the scene, and why? Locate the features.
2. If there is wood describe its general features. Ask what kind of trees predominate; the children may not know; encourage them to find out within a week.
3. Locate the finest tree. Describe it. How did it come to be there?
4. The roads about the country. Are they attractive? Are they good for travel? How could they be improved?
5. Of the homes you can see, which is most attractive? Why?
6. On the return trip, look for the best garden, or other preconsidered feature.
7. Speak of unsightly advertisements along the way. What should be done with them?
8. Where are the best views to be had in the neighborhood? Which windows of the school house open to the best views?

NOTE.—This lesson should be followed by composition work. Read some simple description of scenery in verse. Encourage children to describe in verse the scenery about their school.

IV. FIFTH GRADE: A BROOK

Purpose of the lesson.—To lead the pupil to make definite, accurate observations on some natural feature in his region, that he may lay the foundation for acquiring an intelligent interest in his environment. A brook is here suggested for this series of lessons, but other topics may be as valuable, as a hill, a mountain, some fine country road, a swamp, or other strong natural feature.

The lesson.—There are many ways in which the lessons on a brook may be handled successfully for pupils in the fifth grade. As one means of keeping up an active and continued interest, the following may be suggested: Start a brook book for the work of the

year. Have the pupils feel that in this book there will be kept a record of the brook as they come to know it in 1905-6. The book will be a part of the school property. Each succeeding class will be asked to keep a similar record so that changes may be observed, and in time an interesting history of this outdoor playfellow may be compiled. The pupils should feel the importance of accuracy in all their observations, for history is valueless if inaccurate.

As to the kind of book used, each teacher will have some original plan. It may be well for the children to make it of manilla paper in scrap book form, in which their compositions and observations from time to time may be pasted. Toward the end of the year, perhaps on Arbor Day, some of the best facts may be compiled and read before the school during one of the public exercises. Have a list kept of the number of good observations made by each pupil, and, at the end of the year, find out who has been the most active and patient in his out-door study.

The study of the brook will furnish a motive for the making of a school museum. This museum should become a regular part of the property of the school, as much as books and pictures are. A cupboard can be used for the museum, and the smaller items of the collection may be kept in boxes. If no cupboard is available, shelves may be placed in the corners of the room.

Following are suggestions for the preparation of the history of the brook:

1. If the brook is large, let the territory be marked that the pupils think it will be possible to study. Then have the pupils describe the area that is chosen, in order to get a mental picture of it in its entirety.

2. Exact measurements should be made and recorded. Large numbers in the field cannot do successful work. It may be well to divide the class into sections for making the measurements. If ten boys were sent out on Monday and ten girls on Tuesday, a comparison of the measurements may lead to interesting discussions as to accuracy, etc.

3. Let a list be made of every tree, bush, and plant along the margin, and of every water plant in the brook. If the children do not know the names of the plants, they can describe them briefly. They will soon want to know the names and there will be some way to find out. The important thing is that the children know the plants themselves.

4. There should be also a list of the animal life found in the brook: the fishes, the water insects, etc.; also the animal life living along its banks—salamanders, perhaps, or muskrats, or the evidences of these animals.

5. The pupils in this grade should make a map of the brook, locating anything of importance along the bank; the place where the plane-tree stands; the place where the stranger may seek the pussy-willow; and the place where little patches of water-cresses grow.

6. What farms or homes lie along the brook? A few words of interest regarding the homes will be of value in the history of the brookside.

7. Whenever a new point of interest is observed by one of the pupils, let him write it on a slip of paper with his name and drop it into a box on the teacher's desk. At the end of the month, the best observations can be selected for the brook book. A new plant, a fallen tree, a stone moved by the ice, a bird that stopped for a drink, will be subjects for notes.

8. An effort should be made to discover what this brook means to its adjacent country. How large a country does it drain? Does it dry up in summer? What is its source? Its mouth? Has it tributaries? Does it drain merely the surface water, or is it fed by springs? Is it quickly affected by rains? Does it furnish any water-power, and what? Used for irrigation? For watering stock?

9. Suggestions should be left for future observations by the class in 1906-07. Compare the plant life with that of the previous year. What new plants have entered? What old plants have disappeared? What difference in the animal life, what changes in the homes along the banks, etc.? Correct and complete the map from year to year.

ILLUSTRATIVE LESSONS ON ANIMALS

I. FIRST GRADE: THE CHICK

Purpose of the lesson.—To teach the child to think about a bird's life and form.

The lesson.—The young child is far more interested in what a bird does and how it does it than in knowing the names of kinds of birds. For beginning bird study, there is no better object than the chick—it may be studied at home or in the schoolroom—and by comparing the habits and form of the chick with those of familiar birds, the child will begin bird study with the right sort of understanding and mental attitude. The canary is also a good subject for first-grade work.

In the following lesson the children should study the chick itself and should be led by the teacher to see the points covered by the questions. The ideal way for conducting this lesson is to have a chick in the schoolroom for three or four days, and allow the children to observe it during recess. A chick a day or two old is best for this. If the teacher choose, it may be well to begin the study with a talk about the egg, its shape, its color and its contents. The teacher should tell that the function of parts of the contents of the egg is to nourish the chick as it grows within the egg. This may be compared with the meat of chestnuts or walnuts or the starchy part of the grain of a kernel of corn. A little talk may be given also about the way the hen makes her nest and the length of time required for incubation.

What is the color of the chick above and below? What markings has it? Can you tell by the color of the chick what will be its color when it is grown?

What is the chick covered with? How does this covering differ from that of the hen?

How does the young chick get its food? How does the young robin get its food?

Describe the eye of the chick; can it see straight ahead as we do? Why does it turn its head to one side and then the other when it looks at you? Is this the way the young robin sees?

What does the chick eat, and where does it get its food?

Describe the beak and tell how it is adapted to collect the food.

Does the chick chew its food before swallowing it? Why?

How does the chick drink? Why does it drink this way?

Where are the chick's ears? Does it learn readily certain sounds so that it comes to its food when you call?

What sounds does the old hen make which the chickens obey?

Can the chicken smell? What makes you think so?

Can you see the beginning of the comb? What is the comb?

Describe the chicken's foot and leg. Describe the toes. Which is the longest? Make a picture of a chicken's track.

What are the chick's feet used for beside to walk on? Does the chick or hen walk hop, or waddle when it goes rapidly?

Can the chick fly? Has it any wings? Can the hen fly like the robin or the crow? How far can a hen fly? Why can she not fly farther? Why does she not need to fly at all? Compare the size of the hen's wings with her body, and the size of the robin's or sparrow's wings with its body to answer this question.

Where will the young chick put its head while sleeping after it is grown up? Why does it not do that now?

Did the chick get out of the egg, by its own exertion, or did the hen assist it?

Look at the bill of the chick less than a week old and note the little tooth on the tip of the upper part of the beak. What is this for? Is it present on older chickens?

II. SECOND GRADE: THE ROBIN

Purpose of the lesson.—To lead the child to understand the relation of the bird to the season; to observe its food and the reasons for its migration; the time and manner of building nests and the care given to the young.

The lesson.—The robin is chosen for this lesson, as in most localities of the eastern and central United States it lives its life before the eyes of all, except perhaps those who are in the large cities. Therefore, it is a perfectly familiar object and may be studied thoroly by even the younger children.

The work will naturally begin in the spring, as that is the time when the child is most interested in the birds; and the first lesson naturally is on migration.

Are the robins here all winter? If not where do they go? Which direction is south? How is the South different from the North in winter? Do the robins go south because it is warmer? If so, why do they return when the snow is still on the ground, and the cold weather of March is still here?

What does the robin eat? What does it eat when it first comes north? How long after it comes before it can get the earthworms? Why can it not get the earthworms at first? Bring out from this the fact that the frozen ground may prevent.

The English sparrow is here all winter. Is the sparrow any less afraid of the cold than the robin? Bring out the fact that the robin's food differs from the food of these other birds.

How many colors are there on the robin? What is the color of its breast; top of head; back; wings; tail; legs; beak; the border around its eyes? Is there any white on the robin?

Where does the robin stay when not on the ground? When on the ground, what is it doing? When hunting for earthworms, how does it act? Bring out the fact that it runs a little distance and stops, and goes a little distance again, as if listening to find whether the worms are working near the surface. How does it pull earthworms out of the ground? Do the robins that come first have breasts of the same color as those that come later? Why?

What is the robin's song? Where does the robin sit when it sings? Does it ever sing on the ground? What other notes does it make beside song? Do the robins "talk" to each other?

Where does the robin build its nest? What material does it use? Do the father and mother bird both build the nest? What is the lining of the robin's nest? What is the color of the robin's egg? Do the father and mother bird take turns in sitting on the eggs? How long after the eggs are laid before they hatch? Does the little robin when first hatched look like its parents? It is blind and it stays in the nest and it has no feathers, while the little chick can see from the first and is covered with feathers. How is the young robin fed? How is it kept warm? Do both the father and mother bird feed the young robins? How do the young birds act when the old ones come to the nest? Is the robin's nest kept clean? When the young robins first come out of the nest how do they act? How does the breast of the young robin differ in color from that of the parent? What will become of the young robin next October? If it goes south, how will it know how to get there?

III. THIRD GRADE: FEATHERS

Purpose of the lesson.—To teach the child what the plumage of birds is, and what relation it bears to the life and actions of birds.

The lesson.—This is an excellent lesson for the third grade after the pupils have learned something of the peculiarities of bird life through the study of the chicken and robin. First, choose a feather from the tail of a fowl, and an ostrich or peacock feather, and elicit the likenesses and differences by observations, somewhat according to the following plan:

How are these feathers alike? Bring out in this that there is a central part, the quill or shaft, and from each side of both are the barbs; that along each side of the barb is a little fringe made up of smaller divisions which are called barbels. The names of these divisions should be learned entirely incidentally to the study of the feather itself, and not committed to memory as a lesson.

The differences in the feathers may be brought out in the following questions: Are the barbs as close together on the ostrich or peacock feather as on the feather of the hen? Are they the same color? Are they the same texture? Can you suggest a reason for this difference in form, color, and texture? Bring out in this that the close web of the tail feather of the fowl makes the tail strong and useful as a rudder during flight, while the tail feathers of the peacock are purely ornamental and are a hindrance to the flight of the bird. After the parts of the feather have been mastered, then give a lesson from the domestic fowl, choosing a feather from the breast, the wing and the tail.

Breast Feather: Have the pupils describe its shape and appearance, noting particularly that the barbs extend almost to the base of the quill. Are the barbs near the base of the feather the same in appearance as those at the tip? Bring out the fact that the barbs near the base are fluffy and soft, while those at the tip are stiff and of firm web. Which part of the feather lies underneath and which outside? Bring out the utility of the two parts of this feather, the soft and under part being for the under-clothing of the bird, and the stiff or outer part being for the outer garments.

Wing Feather: Are the barbs on one side as long as they are on the other? Do the longer barbs belong to the outside or front side of the wing, or to the back and inner side? How does this arrangement make the wing strong? Is the quill of the wing feather curved? Which side is uppermost, the convex or the concave side? Which way does the quill bend the easiest, toward the convex or the concave side? What does this have to do with the flight of the bird?

How does the bird fly? This may be taught in several ways; but it should be clearly demonstrated that the bird lifts itself by pushing down with its wings against the air, as a boy jumps by pushing down against his vaulting pole. If practicable, the jumping from a step to the ground with a spread umbrella will give the child some idea of the way that the air resists and holds up the surface pressed down upon it. After this lesson in the buoyancy in the air, the wing of a fowl should be examined and the fact that it is concave and stiff on the down-stroke and convex and limber on the up-stroke should be shown so that the child may understand why the bird, when lifting itself by striking the wings down, does not push itself down when it lifts its wings up. The wing from a fowl ordinarily used for sweeping and dusting, may be used to show the arrangement of feathers in the wing, the way they overlap and the arrangement of the shorter feathers.

Tail Feather: Is the quill of the tail feather curved? If so, is the curve like that of the wing feather? Are the barbs on either side of the quill equal in length and similar in arrangement, or are they one-sided like the wing feather?

By watching a bird flying, bring out the fact that the tail when spread acts as a rudder in balancing the bird and in guiding flight. Observations should be made on the different shapes of the tail of the robin and of the hen, and how the tails of each look when the bird is at rest and when it is flying. What other purposes than that of flight do the tail feathers serve? For this study the feathers of the peacock, the chimney-swift and woodpecker to show that one of these is for ornamentation and the others for use in bracing the bird up against the surface to which it is clinging.

General Questions on Feathers: What are the general differences in color of plumage between the hen and rooster, the turkey gobbler and the turkey hen, the male and female oriole? Bring out from such questions as these the fact that ornamentation and bright feathers make the birds attractive to their mates, and that the dull color of the mother bird lessons the danger of detection when on her nest.

Bring out all of the purposes that feathers serve to birds: for warmth, by the fluffy part of the breast feathers and the down; as covering, by the smooth web of the overlapping tips of feathers and that these are made waterproof by oiling; for flight, as the feathers are used to strike against the air and lift the bird up; also that some tail feathers are used for props in climbing, and finally that there is utility in the beauty of the feathers of our brightly plumaged birds. Lest the pupils believe the widespread fallacy that "the

bird's feathers make them lighter," the feathers should be weighed to show that they are no lighter than air; at the same time they should be studied with a view to bringing out the fact that they are as light as need be, and at the same time strong.

The above lesson may be correlated with drawing, both with pencil and in the case of the brighter colored feathers with water color.

IV. FOURTH GRADE: ECOLOGY

Purpose of the lesson.—To relate bird life to its environment and also to the life of the pupil.

The lesson.—A few of the common birds that are of greatest economical importance should be studied: the chickadee, the oriole, the blue bird, the phoebe, and the king bird are good subjects. The pupil should become familiar with the appearance of each. In order to do this, he should be able to describe the bird; this is an excellent lesson in careful observation. First, the pupils should be able to determine the size of a bird; this he can do by comparing it with the robin or the English sparrow. Second, the color in general, that is, gray, blue or brown. Third, the colors of the different parts of the bird: the color of the breast, throat, top of the head, eye markings, top of the back, wings, tail, and under parts. An excellent way to fix such markings in the mind is to have an outline of the bird, and in the drawing lesson let him fill in the colors where they belong. Of course it would be far more desirable to have the pupil sketch the outline also. The pupil should endeavor to determine whether these colors and markings have any special relation to the welfare of the bird; whether they afford protection from enemies or otherwise help to adapt the bird to its environment.

After the color is fixed in the pupil's mind, the question of the food of birds should be discussed. This will have to be largely an information lesson on the part of the teacher, but correlated with this information, the pupils should make observations on how the bird gets its food. The chickadee hunts over the twigs and buds of trees for insect eggs; the blue-birds get much of their food on the ground by taking cutworms, locusts, crickets and grasshoppers; the oriole hunts for caterpillars on the leaves; the kingbird and phoebe perch in some open place and dart into the air after flies and beetles. All this may be observed by the child of any town or country, except the large cities.

An excellent way to impress on the pupil the economic importance of birds is to get from the Department of Agriculture, Washington, the bulletin on the food of nestling birds, and have the pupils make drawings similar to those on Plates 50 and 51, showing diagrammatically the proportion of the different insects used by common birds for food.

If the teacher desires, this line of inquiry may be further developed by considering the habits and food of crows, hawks, owls; also of pugnacious and destructive birds, as English sparrow and shrike.

Bird Houses: With the knowledge that the birds are beneficial, there comes to the child the natural desire to protect them and make them comfortable. If the pupils have manual training, let them make bird houses as a part of their work; if not, encourage them to make these houses at home and put them in the trees or on buildings nearby, where their occupants may be watched. Bluebirds and martins are most desirable tenants for these houses. A study should also be made of the ways of making birds comfortable, as follows: Methods of keeping the cats from taking birds and their nestlings; feeding the winter birds with suet, and thus attracting them to the orchards where they will destroy insects in their winter quarters; giving special attention to the protection of nests during the nesting season; placing pans of fresh water where the birds will find it; the planting of trees and shrubs which the birds find attractive for protection, nesting, and food.

V. FIFTH GRADE: A BIRD GROUP

Purpose of the lesson.—(1) To familiarize the pupil with a definite group or class of birds. (2) To train the powers of critical discrimination, by studying objects that are very similar.

The lesson (woodpeckers).—By the time the pupil has reached the fifth grade, he should have made many observations on the form, appearance and habits of the common birds. It is time, therefore, that he becomes interested in the kinds of birds of the region. In order to do this, it is best to consider one group at a time and learn all the common species belonging to it. Thus the eye becomes trained to look for similarities in habits, in flight and in appearance; and after the pupil comes to know three woodpeckers or three thrushes or three sparrows, he knows better what to look for in completing his knowledge of the group. Of all the groups, perhaps none is more interesting or offers better opportunities for study than the woodpeckers. These birds are of the utmost importance economically; they also have striking modifications of form and are noticeable birds wherever they may be.

The work should preferably be begun in the winter. In most localities, by placing suet upon the trees, the downy woodpecker may be called within sight of the windows and its habits studied. A field note-book may be started with this lesson on the downy woodpecker.

If possible, the note-book should show sketches of the different birds studied, and these sketches may be made in color although this is not strictly necessary. While studying the woodpeckers, comparison should be made between them and the nuthatches.

The pupil should always endeavor to determine the general life story of each of the kinds: resident or migrant; if migrant, when they arrive and when they leave; what places they frequent, woods, open fields, yards, swamps, etc.; where they rest, kind of rest; how many eggs and description of them; plumage of young birds; song or notes; and other field observations.

Downy and Hairy Woodpeckers

1. What is the general form, size and appearance of the downy woodpecker?
2. What is the color of the downy woodpecker above? Below? Top of its head, its throat and breast?
3. The difference in color between the male and female.
4. How does the downy go up a tree? Explain the use of the feet and the tail in the downy's climbing. Note the shape of the tail feather of the downy and compare it with that of any other bird. Note the arrangement of the toes, and how they assist the downy in clinging to the bark.
5. How does the downy go down a tree trunk? Does it ever go head first?
6. Why does the downy climb trees? What does it use its beak for? Is its beak shaped for this purpose? How does the downy manage its head to make its blows forceful?
7. Has the downy any song? Describe its note.
8. Note the woodpecker drumming. What is the drum and how and when does it use it? What is the drumming for?
9. The downy stays in the North all winter. Why is it, therefore, of the greatest importance to the orchardists and farmers?
10. Another woodpecker remains in the North all winter; it resembles the downy very much except that it is about one-third larger. This is the hairy woodpecker. The pupils should be encouraged to look for this bird during the winter months.

The Sapsucker

The next woodpecker to study may be the sapsucker. While this bird winters in our southern states, it is a migrant in April and September in New York and New England. The sapsucker should be described in comparison with the downy.

1. General form, size, and appearance.
2. Color of back, top of head, throat, and breast of male and female.
3. Are its habits like those of the downy? Does it hunt for insects like the downy? (Special stress should be laid upon the fact that the sapsucker is largely an insect-eating bird and that its habit of sap drinking is incidental).

4. Note the holes made by the sapsucker. Are they in rows? If so, do they reach clear around the tree?

5. Would the sapsucker kill the tree unless the holes completely encircled the tree? If not, why?

6. In what kinds of trees have you found the sapsucker holes? What does he make these holes for?

The Redhead Woodpecker

The next woodpecker will probably be the redhead, as this is very striking in appearance and most children know it by sight.

1. General form, size, and appearance.

2. Make a careful description of the colors of the redhead. Compare it with the downy. Is the redhead seen on trees as much as the downy?

3. Does it eat fruits or nuts? Does it stay with us all winter? If so, what does it live upon?

4. What does it use for a drum?

The Flicker

The flicker, is one of the most noticeable of the woodpeckers, and is everywhere common in most localities during the spring and summer months.

1. Describe the flicker. Compare color and size with that of the downy.

2. What is the difference in color between the male and female?

3. What is the flicker's note? Compare it with the downy's.

4. Why does the flicker spend much of its time in meadows? (Bring out the fact that the flicker lives largely upon ants).

5. When the flicker flies it shows a certain white mark, where is this? Compare it with the white that shows on the meadow lark when it flies.

6. What is there peculiar about the flight of woodpeckers as a whole? Which is especially evident in the flight of the flickers?

7. Which of all the woodpeckers are the most beneficial to man?

ILLUSTRATIVE LESSON ON PLANTS: PARTICULAR PLANTS AND PARTS OF PLANTS

I. SECOND GRADE: LEAVES

Purpose of the lesson.—(1) To teach the child some of the ways in which leaves are related to the remainder of the plant. (2) To draw out the fact that there is great difference or variation in leaves, and thereby to lead on later to the fact of variation in general. (3) To interest the pupil in form and color.

The lesson.—If possible, make the observations on leaves that are still on the plant. A window plant may answer, but it is better to have the first observations made in the open. Do leaves have any relation to light? Are they borne near the ends of the twigs? Where do you find the biggest leaves? Are the stalks all of equal length? Why? In the window, note how the leaves turn toward the light. Do the leaves change color where there is little light?

After the study of leaves in the fall comes the effect of frost on vegetation and the pupils should discover for themselves that when the plant or tree dies there are no leaves left on it. This lesson should be taught in many forms, so that the child will realize that leaves are an important part of the life of the plant.

To relate the work to the life of the tree, competition may be started to see whether any pupil could find two leaves alike on any tree. This may be done after the leaves have fallen, so that the pupils may gather leaves from the ground. This will be excellent exercise in training the children to close observation.

A Study of Leaf Form: The teacher might bring into the school room the leaves of cabbage, sweet peas, nasturtiums, maple, and pine. Observation lessons should be given

on each on succeeding days, and in each case the leaf should be connected in the child's mind with the plant on which it grows. At the end the lesson should be unified by teaching the fact that these are all leaves altho they are very different.

Study of Color with Form: Let the children bring to school leaves of all sorts, which have autumn tints. They will be specially interested in picking up the bright-colored leaves that fall from the roadside trees.

Let them classify the leaves according to color, so as to train the eye to discriminate the tints and color values.

Let them classify leaves according to form, selecting those which resemble each other.

Ask them to tell in what respects they resemble each other in this way, incidentally calling attention to the margin, the veins, and the petiole.

Incidentally teach the names of the leaves of the most common trees by mentioning that certain noticeable leaves are the maple or oak or elm, etc. The children will quickly pick up these names by themselves if thus taught, and the knowledge will help them later on.

Let each child choose a leaf for himself and draw it. The drawing may be done by placing the leaf flat on paper and outlining it with a pencil, later drawing in the veins, or the drawing may be made with colored crayon, free hand. The pupils should be allowed to please themselves in this matter, as it is not a drawing lesson, but a lesson on form and color.

Let the pupils choose paper of a color similar to that of the leaf, and cut the leaf from it during "busy work."

Let each pupil choose four leaves of maple or oak as nearly alike as possible and press them in his book, and later arrange them on a card in some symmetrical design. This may be done while the leaves are fresh, and the card thus arranged may be pressed and thus preserved. If possible, have these leaves teach some life-lesson—that no two are alike, that they come from different trees or from different parts of a tree, from shade or sun, etc.

II. THIRD GRADE: HEPATICA

Purpose of the lesson.—(1) To put the pupil into first-hand relation with some plant of which he is fond. (2) To afford a means of developing exact observation.

The lesson.—There are several ways of getting acquainted with a plant: one is to go a-visiting, and another is to invite the plant to our own home, either as guest on the windowsill, or as a tenant of the garden. When we visit the hepatica in its own haunts it is usually with the longing for spring, that awakens with the first warm sunshine, and which is really one of the subtlest as well as greatest charms of living in a climate that has a snowy winter.

It is usually when the hepatica is our guest that we have a better opportunity for studying its form and features. Take up a hepatica root in the fall, pot it and place it in a cool cellar until March 1. Then give it light, warmth, and moisture on your table, or the window-sill, and it will soon begin to grow. Or if we are not sufficiently forehanded to get the root in the fall, we can get it during a thaw in February or March.

Whether in the woods or the schoolhouse, the progress of the hepatica should be watched and noted day by day—when and how it first makes a start, its condition at the next and the next observation, and thus continuing, if possible, until the seeds are ripe. We have a careless habit of forgetting all about plants after their blossoms fade unless their fruits or seed are good to eat or good to look at. This is as inconsistent as it would be to lose all interest in the farm after the fields were planted. After the flower is gone, the plant must mature its seeds and somehow must sow them. If possible, observe the hepatica thru the summer and autumn, for we should know what is happening to it every month. That is, the complete life-cycle or year-cycle of the plant should be known, not merely one epoch in its life.

It is in early spring, however, that the most interest attaches to the hepatica. Such questions as the following may then be considered:

In what situations are the hepaticas found? What kind of soil?

How does the hepatica prepare for the winter and store up energy for blossoming early in the spring? That is, why does it bloom so very early?

How early do you find blossom buds down in the center of the plant? Did you ever look for these buds in the fall?

Do the flowers come out of the crown bud?

Are the leaves that come up late in the spring as fuzzy when they first appear as those that come up early? Do the leaves last over winter?

What are the positions of the flowers at night, in the morning, at midday?

Compare the shapes of leaves on different plants; also the color and size of flowers.

How many petals or flower-leaves has the flower?

Try to interest the pupils in waiting to see the seeds and to describe them.

IV. FOURTH GRADE: WILLOW

Purpose of the lesson.—(1) To carry the pupil one step farther in its contact with its environment, finally leading up to trees. (2) To afford one more means of developing the observation.

The lesson.—Every child may know some kind of willow. He is always interested in the "pussy willows," but seldom cares much for these bushes after the "pussies" are gone; in fact, in summer he may not recognize the pussy willow.

First, try to bring the pupil into relation with willows in general and where they grow. Is there more than one kind? Are some of them trees?

Then, having found a willow bush, set the pupils at work on it. Let them describe it. If in winter, the shapes and colors of the twigs and the buds may be described. Cut long, strong twigs and place them in bottles of water in the schoolroom. Change the water frequently, and cut a thin slice from the lower end of each twig now and then to expose a fresh absorbing surface to the water. Soon the buds will swell. How do they change in shape, size, and color? How many bud-scales? Describe. Make descriptions and drawings of the "pussies" as they come out, and thereby be ready for the "pussies" when they naturally appear in the swamps.

Make an effort to match the leaves with the flowers (or "pussies"). This can be done by marking the plant and collecting leaves later in the season. The pupils will find the unfolding of the leaves to be quite as interesting as the unfolding of the flowers. Some such method of leaf study as is advised for the second grade may be applied to the willow.

It is easy to carry the pupil through observations on willow flowers; to note how the pollen is transferred; to watch for the fluffy seeds. The [pine-cone willow-gall is also a most interesting subject.

Willows grow readily from cuttings: the pupils will be glad to learn how.

V. FIFTH GRADE: A TREE (MAPLE)

Purpose of the lesson.—(1) Still further to relate the pupil to the world in which he lives. (2) To bring the pupil into contact with a tree as a living organism. (3) To determine what phenomena are transpiring about the tree and within the limits of its parts. (4) To become acquainted with the different parts of a tree. (5) To discover what events overtake the tree during the year. (6) To learn or identify the kinds of trees.

The lesson.—It is best to study one tree during an entire year, thus cultivating in the pupil the habit of seeing and knowing a tree thoroly. This habit will be of the greatest importance in a later study of the trees of the region. To begin the study, the pupils should have a note-book which is to be devoted to his observations on the tree for a year. This note-book should be large enough so that a leaf may be sketched in it lengthwise. A favorite tree in a schoolyard should be chosen for this observation; it is far better if

this tree may be seen from the schoolhouse window. The maple is an excellent subject for this first study in the north-eastern states, as it has many interesting features; but similar work may be undertaken with any kind of a tree, only it is always best to choose a species that is characteristic of the surrounding country.

Call attention first to the relation of the tree to its environment. If the tree is a maple, determine on what soils it usually grows. How abundant are these trees in the neighborhood? In what places are they commonly found? Do they grow alone or with other trees? Do they grow to be very large? To what uses do the people put these trees? And similar general questions.

The Tree Itself, In Foliage

Work may be begun in September and continue once a week until the leaves all have fallen. The work should be done in separate observation lessons, not more than fifteen or twenty minutes long, and may be made in the yard with the teacher or by the pupils themselves at recess, the teacher each time suggesting lines of observation. These observations should cover the following points:

1. The shape of the tree, i. e., whether its trunk is bare for some distance or whether the limbs grow near the ground; whether the branches at the top are spreading or close. A sketch should be made in pencil or water color of the general shape of the tree.
2. Are the leaves borne near the trunk of the tree, or are they borne on the tips of the twigs? Get from this observation the relation of leaves to the light.
3. Are the leaves opposite each other on the twigs?
4. What is the color of the leaf above? Beneath? Are all the leaves on the tree of the same color? This observation must be made each week, showing the change due to the autumn influences.
5. The approximate length and width of the largest leaf; of the smallest leaf.
6. Find the greatest variation in shape, if possible, in two leaves of this tree.
7. Study the leaf-stalk, or petiole, and its relation to the twig. Is the stalk the same length on different leaves? Does the length of the stalk have to do with the leaf reaching the light? Is there a bud in the axil where the stalk joins the twig?
8. What sort of an edge has the leaf? What is the color of the veins of the leaf, i. e., does each vein branch off the midrib or do the veins themselves branch? Do the veins extend to the end of the leaf? If so, do they end in a point on the margin or at the base of a notch?
9. Careful drawings should be made in the note-book of a normal leaf of the tree and its fruit (if the fruit can be had). The changes of the color of the leaves should be noted each week, and also when the first leaves begin to fall; also, the effect on the leaves of the heavy winds and rains, and finally what becomes of the leaves after they have fallen.

The Tree in Winter

1. General shape of the whole tree.
2. Height of bole as compared with height of tree.
3. Is the bole slender or stocky? Does it continue straight up or divide into great branches?
4. What sort of bark has it, rough or smooth? If rough, are the ridges or sutures far apart or close together? Do they intersect or are they distinct and vertical?
5. What is the color of the bark and what blotches or marks are there on it?
6. Are the lower branches very large? Does the bark on them resemble that on the trunk?
7. At what angle do the branches in general stand to the trunk?
8. Are there many large branches?
9. Where is the spray borne, along the branches or at the tips? ("Spray" is a term used for the mass of twigs because they resemble the spray of a fountain.) Study

the spray; is it coarse or fine? Does it stand erect or droop? What is its color?

10. Make a drawing of the tree in pencil, showing it bare of leaves. Draw a twig with buds.

The Tree in Early Spring

About the last of March, bring in twigs from the trees, to be kept in a warm room and in the sunshine. Place the twigs in water and watch the opening of the leaves. Later, when the leaves open on the trees, note the following:

1. How the leaves are folded, as shown by the wrinkles in them, as they come from the bud. The falling of the bud-scales. The color of the leaves when they first come out, and how long it takes to change them to green. The leaf should be sketched in a notebook in all its stages of development.

2. The flowers of the tree should be studied, noting the shape and color, and week by week the development of the flower into the seed should be noted.

3. During the spring the shade cast by the tree should be studied, noting how it grows more dense; also the extreme points reached by the shade night and morning should be marked and noted.

4. In connection with the shade, the arrangement of the leaves should be again studied, noting that the leaves in their efforts to reach the light make a complete canopy. A water-color sketch of the tree in its June dress should be made, showing the shadow which it casts, and the shape of the shadows in the top indicating the position and direction of the branches.

The Utility of the Tree (Maple Sugar Making)

1. Is the tree tapped on all sides? If so, why?

2. How deep must the spiles be driven successfully to draw off the sap? Would you tap a tree directly above or at the same spot tapped last year; or would you place two spiles one above the other? Give reasons.

3. Why does the sap flow freer on warm days after cold nights?

4. Is the sap of which we make sugar going up or down?

5. How does the sugar come to be in the sap?

6. Why is the sugar made during the "first run" better than that which is made later? Why cannot you make sugar in the summer?

7. Does it injure trees to tap them?

8. Do the holes made in earlier years become farther apart as the tree grows?

9. What other tree besides the sugar maple gives sweet sap?

10. What animals, birds and insects are often seen in the woods during sugar making time?

11. Study the tracks of the animals on the snow in the woods; make pictures of them and tell what animals made them.

AGRICULTURE IN SCHOOL YEARS 6 TO 8

After the explicit nature study ceases with the fifth grade, the pupil in the rural school may then be taken through the elements of agriculture in the sixth, seventh, and eighth grades. The work in these three grades should really be nature study, but agricultural subjects are the means. Some will prefer to call it nature study rather than agriculture. Its purpose is not so much to teach definite science as to bring the pupil into relation with the objects and affairs that are concerned with the agriculture of his region.

When the pupil has completed his nature study in the fifth grade, he should have a good knowledge of the physiography of his region, and of the common animals and plants. He will then be able to carry his inquiries into the more specific field of the agricultural practice and operations. When he has completed his eighth year, he should have a well developed sympathy with agricultural affairs and he should have a broad, general view of them. Entering the high school, he will then be able to take up some of the subjects in their distinctly scientific phases. If the high school has no adequate course in biology, then the student can be given a good drill in botany and zoölogy with particular reference to its agricultural relation, and this might be called "agriculture;" but it would be better if the student could have his fundamental training in biology in the first year of his high school and let him take his agricultural science thereafter. The agricultural work in the high school should have a distinctly scientific value. It should be such as would count towards science entrance requirements in case the student should desire to enter an agricultural college.

If the agricultural work in the grammar grades is to be of the nature-study kind and not of the science kind, it can then cover a somewhat wide range. In these grades, the pupils should not be put into "agronomy," "economics," and other technical subjects, but he should be brought into relation with his agricultural environment..

The following classification of subjects may be helpful as expressing the general judgment of the committee; but the value of the work will depend entirely upon the way it is taught. It is the judgment of the committee that in these grades (sixth to eighth) the work should not be taken up for the scientific point of view. However, all this work, as well as nature-study work preceding it, should be taken up primarily for its scholarship value.

The committee does not desire to recommend work for the specific grades or parts of grades, but it believes that the following subjects can well be covered in grades from sixth to eighth inclusive, and preferably in the approximate order in which they are given.

FIRST HALF YEAR: THE AFFAIRS OF AGRICULTURE

The place that the farm occupies as a part of the community life. What the farmer's business is; what he does; what he sells; how he spends his year.

What is the nature or kind of agriculture of the particular region.

What outside help the farmer has; good roads; telephones, rural free delivery; experiment stations; colleges; markets. Gather rough statistics from the farmers of the neighborhood. Write up the farms of the district as to history, size of buildings, etc.

SECOND HALF YEAR: THE SOIL

Here may be introduced many experiments as to the physical conditions and texture of the soil. Soils of the neighborhood may be gathered and classified.

Let the pupil classify the soils on his own farm and make a chart as to the soil distribution.

General ways in which the soil is improved as to plowing, tilling, rolling, cover-cropping, fertilizing, and the like.

SECOND YEAR: FARMING SCHEMES AND CROPS

The general lay out of the farm; rotation schemes and mapping. Farm crops; the crops or their products themselves to be studied, sometimes in the school room. Ears of corn, for example, may be studied and "judged" as a part of the school exercises. The same may be done with potatoes, grains, and fruits.

The crops to be studied as they are grown in the community; let each child report on the crops and the cropping schemes of his own farm.

THIRD YEAR: ANIMALS

What animals are a part of the farm enterprise, and why.

What relation these animals bear to rotation of crops or other farming schemes. Relation they bear to the fertility of the land. Relative importance of different kinds of animals and why they are raised.

Some general studies of the different breeds of animals and also "points" of specific animals and something of the judging of animals. Some observations may be made on feeding and the like.

A good text-book treating in a simple way the soil and the plant and animal life of the farm may be used with profit to supplement the actual study of the things themselves.

Supplementary reading matter, treating country life subjects, may well be used in connection with this work.

As the demand for instruction in the elements of agriculture in the rural schools is more general than that for any other phase of industrial education, some disappointment may be felt that the committee has not presented a detailed course in this subject, especially adapted to the needs of the district school. This matter was carefully considered by the committee. It seemed evident that to attempt anything in the way of a detailed course of study would, at best, result in a course adapted to a limited area. Agricultural conditions are so varied in this country that work which might be profitably undertaken in the schools of one section, would not be well adapted to the schools of another section. For this reason the committee adopted a general rather than a detailed treatment of this subject.

Courses more or less in detail are being worked out in different states adapted to local conditions. The dean of the College of Agriculture in Illinois has prepared a course of study in agriculture for Illinois, and the state superintendents of Missouri and Indiana have prepared courses for their states respectively. In Wisconsin, for a number of years, a course of study in this subject has been published yearly for use in teachers' institutes. The agricultural college in Minnesota has prepared and issued a valuable bulletin on the teaching of agriculture in rural schools. The United States Department of Agriculture has issued a most excellent bulletin on this subject—*Circular No. 60*.

INDUSTRIAL EDUCATION IN THE CONSOLIDATED SCHOOL

As the self-binder took the place of the reaper, the consolidated school seems destined to take the place of the rural one-room school, at least in all regions where a good soil supports a large agricultural population. The one-

room school is such a small unit that it cannot afford efficient instructors who make teaching a business. The teachers cannot afford to train themselves specifically for the general school work, nor for teaching the technical industries of the farm and the farm home. A well-nigh universal lack of organization of the course of study exists. The small rural school does not arouse sufficient interest in parents and pupils to bring about the best work. Rural-school houses and grounds show a lack of interest on the part of communities. The extended body of thought becoming rapidly available from experiment stations and agricultural colleges is not being successfully placed in these schools; the teacher lacks preparation and the school lacks equipment. Even the introduction of school gardens on the grounds of the rural school, has been found most difficult because of a lack of knowledge of gardening on the part of the teacher, and because of the absence of persons to care for the garden during the long summer vacation. The teachers in the rural schools are not well adapted to uniting school instruction in the farm and home industries with the work the pupil does under the guidance of his parents, as for instance the chores and vacation work during the weekly and longer vacation periods.

With a consolidated school covering a district of twenty-five or thirty square miles, the pupils transported at public expense, two or three acres of land, a school building with four rooms, and possibly an additional practice room; with the principal trained to teach agriculture, an assistant trained to teach home economics, and two other teachers to aid in general instruction, the consolidated school would provide instruction under almost ideal conditions. Half the land could be used for field crops on which instruction could be given in farm management, the rotation of crops, the fertilization of the soil, the cultivation and handling of crops, methods of handling pastures, etc. The other half of the miniature farm should be laid out as a combined campus and farmstead. On this, besides ample playgrounds, there should be timber plantations showing how to grow shelter belts and wood lots; also orchard, small fruit, and vegetable plantations, to show the varieties best to use and the methods of cultivation. There could also be minor experiments carried out, as with hot beds, grafting, plant breeding, etc. Here the principal could be supplied with a dwelling, that he and his family might be a part of the school life. There should be sufficient equipment to handle some outdoor instruction, also some laboratory equipment for the practice room, both for the teacher of agriculture and the teacher of home economics.

One of the most important possibilities in this kind of schools is joining the school instruction, concerning the farm and home, with the actual home work of the pupil. The total training which may be given a boy and girl with the rural school and the homes thoroly united in building up the character, the knowledge, and the skill of the pupils is far greater than it is possible to give children in city life. With the well developed consolidated school, equipped with teachers able to give instruction not only in the common branches but in the common industries and home-making, the normal

development of the country boy and girl would be much better provided for than it now is.

Teachers who are thus situated in a country school, with equipment and surroundings drawing the school work strongly toward country life, would be imbued with a spirit which would lead them to find in local environment material available for use in many of the general school subjects. The teachers would also be in a relation with the practical business and home-making of the community, and the school would be permeated with industrial and country-life subjects. All this would add to, rather than take away from, the interest in the general school work. Giving the parents as well as the pupils reason for faith that the consolidated school is useful in encouraging the farm boys and girls in country life, would lead the pupils to desire to remain longer in school, and would induce parents to encourage attendance through a longer period of years, and thus the aggregate of educational results for the community would be increased.

Besides the many things which may be incidentally brought into the school work, some such outline of industrial subjects as the following might be added to the general course of study for the first eight years:

FIRST YEAR

Plants familiar to the pupils.

SECOND YEAR

In the reading lessons, use in part themes from nature, the farm, and the home.
Some general work with animals of the farm and locality.

THIRD YEAR

With the reading work, include nature studies.
Under general exercises, devote some time to home life on the farm.

FOURTH YEAR

Include in the reading some country life literature.
In the geographical lessons, include the geography and distribution of farm products.
Under general exercises, include some work in agriculture and home economics.

FIFTH YEAR

In the reading, include stories of our country, and lessons in agriculture and home economics.

In geography, include that part of physical geography which deals with the work done by Nature's forces in preparing soils.

Under general exercises, include some work in garden and horticultural work.

SIXTH YEAR

The reading lessons should include some studies of animal life; the physiology should include the elementary facts of nutrition and food values.

During this year the boys should be given some general exercises on animals; and the girls, in sewing.

SEVENTH YEAR

The reading should include matter pertaining to agricultural and household affairs.

A brief study of field crops could be appropriately given, and some study made of co-operative agricultural enterprises, as co-operative creameries, co-operative grain marketing, co-operative drainage, etc.

Sewing should be continued by the girls.

During this year literary society work should be taken up, that farm boys and girls may know how to work in public meetings; to carry on the operations of deliberative assemblies, etc., and this work should continue throughout the course.

EIGHTH YEAR

The reading on industrial subjects suggested for the seventh year should be continued as a part of the reading exercises for this year.

Some attention should be given, in connection with advanced arithmetic, to land surveying and farm statistics.

Further work should be included concerning animals and plants; for boys, exercises in wood work, and for girls, exercises in home economics.

With the addition of a course covering the first and second high school years in the consolidated school, considerable more technical instruction may be given.

NINTH YEAR

In the first half of the year, work may be taken in agricultural botany, drawing of farms and farm buildings.

A text-book, treating the elements of agriculture more systematically and more fully than the subject has been treated in the special reading suggested for the grades, may be studied with profit.

Sewing may be continued by the girls.

During the second half of the ninth year, agricultural botany may be continued, and a brief course given in farm accounts for both boys and girls.

A brief course in fences and farm conveniences could be added for the boys, and a course in cooking for the girls.

TENTH YEAR

During the first half of the tenth year the boys may take up the special subject of judging stock and seeds, and exercises in carpentry, while the girls should continue cooking and the study of foods.

During the second half of the tenth year both boys and girls might be given the subject of agricultural mathematics, while for the boys the practice work of judging stock and seeds could be continued, the girls taking work in household management and affairs.

The work in the county and state agricultural high schools could be made to articulate directly with this practical work in agriculture and home-making, the students going away from home for only the third and fourth school years. Thus not only would the expense be less during the first and second high-school years, as the cost of travel and board would be saved, but pupils would be constantly developing and applying in their practical work at home the things learned in school. All parents would greatly appreciate a school plan that would enable them to keep their children at home until well thru the most critical period of youth.

A consolidated school developed along the lines indicated could rapidly build up a splendid library of books relating to affairs in country life, and the people could be encouraged to use these books and also to build up libraries of general and technical literature in the country homes. The school would become a center for meetings and for general information, as well as a source of great inspiration through the school work.

A well developed consolidated school plan would give new and larger educational and social units for our farm communities. Co-operative effort and enterprises would be greatly encouraged and developed and by the larger unit. For these schools of larger units, the state and county could provide many things of value to the pupils. Some technical subjects might be given by teachers travelling from school to school. Farm organizations, such as the grange, farmers' clubs, and farmers' institutes, etc., would find in these school buildings suitable meeting places where much valuable educational work could be carried on.

INDUSTRIAL EDUCATION IN THE RURAL HIGH SCHOOL

In this class of schools which includes the village high school already mentioned, the industrial subjects recommended for the ninth and tenth years of the consolidated school should be offered. This work may be preceded or accompanied by such portions of the subjects suggested for the seventh and eighth grades of the consolidated school as may seem desirable; and may be supplemented by work selected from the courses for agricultural high schools, as given in Appendix A and Appendix B.

HOW TO MAKE A PLACE FOR THE INDUSTRIAL PHASE OF EDUCATION IN RURAL SCHOOLS

Any proposition for the introduction of a new phase of educational effort into the work of the schools is met at the outset with objections. The poor results in the teaching of the common branches, too often apparent, are given as good and sufficient reasons why no other work should be attempted. It is assumed that the poor quality of these results is due to lack of time in the school and that, therefore, there is no time for anything else.

The other objection is that the course of study is now overcrowded and that in the rural district schools especially, the variety and number of classes renders it impossible to organize and instruct additional classes in new subjects.

As to the first objection, it may be said that the poor results in the teaching of the common branches is not due to lack of time on the part of pupils, so much as to poor teaching and lack of proper organization.

The second objection is likewise not well founded, because the overcrowding of the course is not due to the number of subjects, but to the attempt to teach too many things in these subjects which are not worth the teaching.

The subject matter in the common school course of study needs a critical revision, not so much with the idea of eliminating entire subjects as for the purpose of cutting out matter now found in most text-books in the treatment of these subjects, and upon which much time is spent in the school without profit to the pupils.

Text-books are made to sell; most publishers recognize that certain detail of treatment of a subject is regarded as of vital importance by one superintendent while another regards it as utterly without value. The argument of the publisher from the commercial standpoint is that if this detail is supplied, it will meet the requirements of the one, and can be omitted by the other, and thus the book may be accepted by both.

In the rural schools the supervision is necessarily lacking in effectiveness, and the teachers not feeling themselves competent to make proper eliminations, undertake to teach everything in the book, which was made to include everything which anybody might wish to teach.

In determining what matter may be eliminated with a positive gain to pupils, the following tests should be applied:

Has it a value as usable knowledge sufficient to warrant its retention?

Is there other matter of greater value as usable knowledge not now taught, but which can be taught if substituted for that of less value?

If its value as usable knowledge is not sufficient to warrant its retention on that ground, has it a value for training which will justify the expenditure of the time and effort essential for its mastery?

Is there other matter, of equal or greater value as knowledge but with a greater value for training, which can be put in its place and for which there is no time unless it be put in that place?

In no case is there any justification for the retention of any matter in the course of study, whatever its knowledge and training value, if its retention prevents the introduction of other matter having a greater knowledge value and an equal or greater training value.

It is believed that the application of these tests would result in such a pruning of subject matter in the present course of study, and such a recognition of the knowledge and training value of industrial subjects, as would give them their proper place in the course of study without overcrowding it.

It is recognized that this is not work which can be done properly by inexperienced teachers. If properly done at all, it must be by those competent to judge of the needs of the child, the educational values of subject matter, and the limitations of teachers.

The revision of the course of study on the lines here suggested would be productive of results of the highest value to the common schools.

It is not necessary, however, to wait until this is accomplished before beginning the introduction of instruction in industrial subjects. Some time can be found for this work even under existing conditions. Such instruction may be given once or twice a week in place of other subjects on the program, omitting the other subjects on those days without material loss, especially if the new subjects are given in the following order: The first exercise to be given during the first half hour of the day, the second exercise during the second half hour of another day, the third exercise during the third half hour of the next day on which it comes, and so on, until in a number of weeks each

half hour in the day has been used for one of these exercises. The omission of the regular recitation of any half hour in the regular program once in two or three weeks will not interfere with the progress of the pupils in the regular subjects of the course.

The period for general exercises may properly be employed occasionally for the new line of work.

If the teacher succeeds in interesting pupils in the industrial subject under consideration, much work may be secured outside of the regular school hours.

SECONDARY SCHOOLS OF AGRICULTURE AND DOMESTIC ECONOMY IN RURAL COMMUNITIES

The education which the country boy and girl ought to receive should put them in touch with their environment, and should awaken an intelligent interest in the things immediately about them, and make clear to them the possibilities for intellectual activity and development for the individual who lives in the country. It should make clear to them the necessity for something more than hard physical labor for success upon the farm. It should make evident to them that a trained intelligence brought to bear upon the problems of a farm life is a necessity for the highest success, and that when so brought to bear, if coupled with industry and economy, will produce financial returns secured by only a small proportion of those who find their life work in the cities.

If these premises are correct, then it follows that the country boy and girl should have opportunities in schools open to them and which they are able to attend, for securing a more intimate knowledge of the things with which they are likely to be concerned in after life than is now afforded. They have a right not only to this knowledge but to the kind of training necessarily required in securing it. It is most important to them also that thru this knowledge and training there shall come the development of a new set of interests which under present conditions rarely exist.

To assume that the country boys, 95 per cent. of whom secure in the district schools all the education which they receive in any school, should be compelled to enter upon their life work with little or no knowledge of the plant and animal life about them with which they will have to deal, of the quality and composition of the soil from which they are to secure their livelihood, with no appreciation of the fact that successful agriculture demands the application of a wider range of scientific principles than any other vocation, with no knowledge of the facts and principles of science applicable to agriculture and with no interest in them, with no appreciation of the fact that modern industrial development, with its improved means of transportation and communication, makes the problem of competition as vital a one for the farmer as for the merchant and manufacturer, and without the training which accompanies the acquisition of these kinds of knowledge, is to deprive them

of the very things which are essential to success in their life work, as measured not only from a financial standpoint, but from the standpoint of the development of the individual.

To say that the country girls, who secure in the district schools all the education which they receive in any school, should be compelled to enter upon their life work with little or no knowledge of those things which are essential for the proper administration of a home and the rearing of children, and without the training involved in securing and applying such knowledge of the art of home-making as may be systematically taught, is to deny them the essentials for the highest success in their life work.

No one who knows anything of the teaching in the country schools will contend for a moment that the pupils in those schools are securing this knowledge and training. No one who knows the facts as to the age at which a majority of the pupils leave even the district schools to begin work, will claim that all that ought to be done for them can possibly be done under existing conditions in those schools. This is true because the comprehension of the basic facts and scientific principles which it is necessary to know and apply in successful farming and in the work of the girl in the home, cannot be secured at the early age at which most pupils leave these schools.

Practically the only opportunity afforded for the country boy to secure any working knowledge of the scientific basis of agriculture, or for the country girl to secure any systematic training in the art of home-making, outside the hard school of experience, is that given in the agricultural colleges. These institutions are doing a grand work, not only in the development of the young men and women who attend them, but for the material development of the country as a whole. But at the present time, the number of students attending any one of these institutions in any state is only a small fraction of those who ought to have other opportunities for industrial education than are now open to them or can be opened to them in the elementary schools. If every agricultural college in the land were filled to its utmost capacity, the number of students in attendance would still be only a small fraction of one per cent. of the great number of country boys and girls who receive no education beyond that which the district schools offer.

Of the students graduating from the complete courses of the agricultural colleges, few go back to the farm. Their services are in demand as teachers and in experimental work. Those who do go back to the communities from which they came and put into practice what they have learned in the agricultural college, even tho they have not completed a full course, show the beneficial results of the kind of training given there. The influence of their practice is felt by others and is ever widening. That influence would extend much more widely, and improved modes of farming would make more rapid strides, if opportunities were offered for awakening the interest and intelligence of the boys in every farming community in the state, in matters which vitally concern the people of those communities.

The high schools, as existing in the cities and villages, offer but few opportunities for the country boy or girl to secure the kind of training which will be most valuable for them if they are to remain upon the farm. They will get in these schools a general training such as comes from a study of books but the farmer is to deal, not with books alone, but chiefly with things; and the high school does not effectively train its pupils for this form of activity. It becomes evident, then, that it is desirable not only to modify in some considerable degree the work now done in the district schools, by offering in them some instruction in the study of nature, and in such of the elements of agriculture as is within the comprehension of the pupils attending them, but to organize a class of secondary schools in farming communities which shall undertake to carry on this work beyond the elementary stage and make it accessible to the country pupils at low cost.

It would seem that in most states the county is the smallest unit which should be made the school district for the maintenance of the secondary school of agriculture and domestic economy.

Two types of secondary agricultural schools have been referred to under the "Classes of Schools."

The committee believes that a presentation of the plan of organization, purposes, and scope of work in each of these schools will be of value to those interested in industrial education. The courses of study and outlines of industrial subjects taught in these schools furnish valuable material for those who are seeking to develop phases of industrial education in the rural and village high schools.

Appendix A treats of the county school of agriculture and domestic economy as developed in Dunn county, Wisconsin.

Appendix B treats of the agricultural high school as developed in Minnesota.

Appendix C presents articulated courses in industrial subjects in the consolidated rural school, the agricultural high school, and the agricultural college; as prepared by W. M. Hays, at the request of the committee.

Appendix D presents a syllabus of elementary course in agriculture, proposed by a committee of the Association of American Agricultural Colleges and Experiment Stations, and published by the United States Department of Agriculture—*Circular No. 60*.

PREPARATION OF TEACHERS TO QUALIFY THEM FOR GIVING INSTRUCTION IN INDUSTRIAL WORK IN RURAL SCHOOLS

In this report four classes of schools are specially considered as adapted to the needs of rural communities, and in which various phases of industrial education should be given.

The first, or lowest in rank, is the one-room district school; the second is the consolidated school; the third is the rural high school, which is located in the country or in the small village with a rural clientage; and the fourth is the agricultural high school.

DISTRICT SCHOOL TEACHERS

The members of the teaching force in the school first mentioned are thruout the greater portion of the country, without professional training, and even on the side of academic training, their attainments are in many cases very limited.

As has already been indicated, it is practically impossible to do any considerable work in industrial education in many of these schools because of the immaturity of the children. In those schools where a number of the pupils are of sufficient age to make this instruction of value, something may be accomplished if teachers are adequately prepared to undertake the work. But so long as the district-school teacher is prepared in the district school, or in the district school with a little supplementary work in a city high school, very little can be accomplished in the way of such preparation.

In those states where district-school teachers are graduates of normal schools, provision should be made in the normal school courses for giving such instruction in nature study and the elements of agriculture and in household affairs, as will enable the teachers receiving it to give the elementary instruction possible in the district school. As in most of the states few of the graduates from normal schools are employed in the district schools, but little can be accomplished from this source.

In a few states, notably in Wisconsin and Michigan, distinct training schools with more limited courses of study than are maintained in the state normal schools have been established for the specific purpose of training country-school teachers. Schools of this class should give the instruction necessary to prepare their graduates for this line of work. The work to be given in the training or normal schools should not be confined to the study of text-books. While in some cases the text-book may serve as an aid to instruction, provision should be made for the carrying on of observation, experiment, and practice work adapted to the needs of the district schools.

A statutory provision requiring all teachers in the rural schools to pass an examination in nature study and in the elements of agriculture would direct their attention toward this subject and its literature, and would stimulate school authorities to provide the necessary instruction in those schools whose students become teachers.

In those states where reading-circle work is carried on, at least one of the reading-circle books might be chosen with reference to the treatment of subjects of agricultural instruction. The careful study of such a book by the district-school teachers would broaden their knowledge and be an aid to them in teaching the subject.

Summer schools in different parts of the state devoted to work in nature

study, agriculture, manual training, and domestic art would supplement the work of the training schools and the study of the text-books. These schools would naturally be attended by teachers expecting to teach soon in the district schools where pupils are old enough to make instruction in these subjects possible.

In those states where teachers' institutes are carried on, the major portion of the institute period might very properly be given for one or more years to these three subjects. This would give an opportunity for some experimental work to supplement the work previously done in the text-books by those who had not had any special training. This plan would be of little value in the short institute held during term time. In the summer institute, from two to four weeks in length, much might be accomplished.

CONSOLIDATED SCHOOL-TEACHERS

For the consolidated schools where the greater number of pupils complete the elementary course and a respectable number carry on the work for one or more years beyond the elementary course, more extended work in the field of industrial education may be undertaken, and therefore a broader preparation on the part of the teachers becomes a necessity.

As most of the teachers in these schools would be drawn from the state normal schools, in those states having that class of schools, provision should there be made for a more extended course of training in industrial subjects. One teacher properly trained could carry on this line of work in the different grades of the consolidated school.

In other states, summer schools should be organized in connection with the state agricultural college, offering courses specially designed to meet the needs of these teachers. Such institutions might very properly offer a course extending thruout the year specially adapted to meet the needs of teachers in this class of schools.

The limitations on salaries in the consolidated schools, due to the limited area and property valuation of the district, would doubtless make it impossible to secure graduates of agricultural colleges to give instruction in such schools.

For the work in manual training and domestic science, teachers could doubtless be secured from training schools preparing teachers of these subjects, who could also teach certain of the academic branches.

RURAL HIGH-SCHOOL TEACHERS

In schools of the third class named above, the industrial work, whatever it is, must be carried on by one or more of the regular teachers as a part of their teaching work. These schools are too small and the funds for their support too meager, in most cases, to warrant the employment of special teachers of industrial subjects.

The suggestions made for the preparation of the consolidated school

teacher, for giving instruction in agriculture, manual training, and domestic science, apply with equal force to the high-school teachers now under consideration.

AGRICULTURAL HIGH-SCHOOL TEACHERS

For the agricultural high schools, the teachers of industrial subjects should have the kind of training given in the best agricultural colleges, and in the best training schools for the preparation of manual-training teachers and teachers of domestic art and economy.

These secondary schools, whether as state or county institutions, must have such a standing as to command the confidence and respect of the communities supplying the student body. They must be able to do much more than merely teach the pupils who attend them. Their influence and activities must reach the farming population in the community, and work designed to reach adults outside the school room must be organized in ways which will be helpful and which will firmly establish these schools in the estimation of the public. For such work, it is clearly evident that the best teachers obtainable must be secured. The work and influence of a single teacher in such a school will do more to establish industrial education on an assured basis of support in the minds of the people than the work of hundreds of poorly prepared teachers in the district schools.

AGENCIES AVAILABLE FOR CO-OPERATIVE EFFORT WITH THE SCHOOLS IN THE DEVELOPMENT OF INDUSTRIAL EDUCATION

Certain things may be attempted and carried on through organized effort of societies or individuals, as has been done in Illinois in the production of corn, in New York thru the extension work of the agricultural college in connection with Cornell University, and through the efforts of the Patrons of Husbandry, the farmers' institutes, and agricultural societies in different states, which in some way become a part of the school effort but not a part of the school course of instruction. The work accomplished thru some of these agencies in Illinois and New York is given as furnishing illustrations of effective educational work supplementing the efforts of the schools.

THE WORK OF THE BOYS' EXPERIMENT CLUBS AND OF THE GIRLS' HOME IMPROVEMENT CLUBS IN ILLINOIS

In some states the coöperation between the farmers' institutes and the country schools, with the county superintendent as an intermediary, has been very much to the advantage of both. In a very marked way this has been true in Illinois. The Agriculture College and experiment station directly reaches the institutes, the institutes reach the schools, and the school children carry to homes and farms not represented at the institute meeting much of the

instruction given there. To illustrate: The Winnebago County Farmer Boys' Experiment Club had, in 1904, a membership of four hundred and twenty-five, and the Girls' Home Culture Club an enrollment of three hundred. For three or four years the boys have been growing high-bred corn and taking an active part in the annual county institute. Each boy is furnished about five hundred kernels of corn and enters the competition to see what he can do with it. In his annual report for 1904, County Superintendent Kern makes this remarkable statement:

On the Funk farm, the 1902 breeding block record for ear No. 99, planted in a single row, showed a rate of yield of eighty bushels per acre of seventy-pound corn, while the multiplying record for 1903, planted in five-acre plots, show that plot No. 10, planted from the progeny of ear No. 99, yielded at the rate of ninety-nine and one-half bushels per acre of the same weight of corn. The boy of the Winnebago County Farmer Boys' Experiment Club who won first prize in the corn contest for 1903 had a plot of corn which yielded at the rate of one hundred and twenty-five bushels per acre, while several others had plots that approached the one-hundred-bushel mark.

The applied pedagogy connected with these exercises included statement of methods employed, an itemized account of the cost, (estimating time at thirty cents per hour), the value of the product, and the profits of the enterprise.

This year Supt. Kern has distributed five hundred and twenty-five pounds of sugar beet seed among seventy boys in his county and they will do experiment work in sugar beet growing.

The school population of Mason County, Ill., is 5,515. The country school enrollment included 1,145 boys, and 990 girls. The Boys' Club, March, 1905, had grown to one thousand and the Girls' Club to about eight hundred. The following statement secured from the county superintendent, Mr. Matthew Bollan, vividly illustrates his method of work:

We spend a great deal of time teaching children things, which might be better spent in having them do things, under wise supervision. There is nothing that counts for so much in character building, it seems to me, as that the boy or girl shall do something that requires a sustained effort, something that may not be finished in a day, but requires time and planning, the final accomplishment of which is dependent somewhat upon influences outside of the boy's own resources. I was not particularly sorry when one of my boys reported to me that his corn field, which had been very carefully prepared and planted, had been literally washed away by a heavy rain two days after planting. He must learn sometime that "the best laid schemes o' mice and men gang aft agley." I sent him another ear of Leaming and asked him to prepare another plat and try again.

Feeling that we could better enlist the parents in the work of what I am pleased to call the revival in the study of agriculture, and in the hope that our boys and girls might be taught to *do* things as well as made to know things, I have organized in our county what is known as the Mason County Boys' Experiment Club, and the Mason County Girls' Home Improvement Club. The purposes and plan of work for these clubs are quite similar to those of like clubs which have been organized in other counties of the state, particularly in Winnebago county, where Superintendent Kern has succeeded in awakening an interest in things agricultural. The nucleus for this organization of boys was about two hundred who had been induced to enter a boys' corn contest three years ago, securing the seed through the secretary of the State Farmer's Institute. Although

something more than two hundred boys obtained seed, only fifty-five were able to exhibit their work at the farmers' institute in which the contest was held. This was the largest show of boys' work that had occurred in our county up to that time. Immediately following that institute we began planning for the organization of the boys and girls upon a much larger scale. Circulars were sent from the county superintendent's office to the two hundred boys and to the teachers of the county, explaining the plan of work for what is now our Boys' Experiment and our Girls' Home Improvement Clubs. Boys and girls between the ages of nine and eighteen years were admitted to membership, allowing each to designate the particular kind of farm or household work he or she cared to undertake, but making it obligatory upon all to undertake some special work that should be strictly his own or her own. Registration blanks were enclosed with these circulars, and as a result the names of *seven hundred and sixty boys* and *six hundred and ten girls* were received. By far the largest number of boys agreed to undertake the cultivation of corn, but the variety of work indicated to be undertaken by them covered a very wide range, including the raising of corn, potatoes, cowpeas, popcorn, peanuts, sweet potatoes, turnips, beans, celery, cabbage, and various other vegetables, poultry of various kinds, pigs, and in one case, cattle.

Parents took active interest immediately, and one gentleman gave his boy, who had hitherto taken little interest in his father's work, a fine heifer for whose care, feeding, breeding, etc., the boy was to become entirely responsible. Parents generally promised to furnish seed for those who had agreed to undertake the raising of the different varieties of vegetable products, except corn, and to secure eggs from pure-bred poultry breeders for those who were to raise poultry. Immediately following this first corn contest and just before the present clubs were organized we undertook an excursion to Champaign. It was widely advertised at the farmers' institute and thru the schools, and as a result we took more than six hundred persons to the University of Illinois and its experiment farm. The results of that day's excursion have been far reaching in their beneficial effects upon the farm work of the county, and were somewhat directly responsible for the large and enthusiastic membership of both of the clubs. Each member of each of the clubs was furnished with a small button especially designed for the purpose. The funds for purchasing these buttons and for purchasing the seed corn for the boys were provided by an appropriation of \$50 from the county board.

We had selected from the best corn breeders nine bushels of the best seedcorn we could get, and had the same shipped to the county superintendent's office. In the interim between the receipt of this seed and sending it to the boys, probably one hundred and fifty farmers came to the office and looked it over. There were a few of them who had much better corn in their cribs, but none of them brought it in to make comparison. Shortly before the time for planting, this corn was sent out, one ear (about one thousand grains) to each boy. Before sending, the ear was carefully described upon the clasp-envelope secured for that purpose, the description including the weight, circumference, length, number of rows, number of grains, proportion of corn to cob, etc. Thus each boy had before him the name of the variety and the description of the individual ear from which he was to grow his corn crop. The pupils who were to raise poultry were given some assistance as to where to secure the eggs for their beginning, and in most cases that assistance came from the parents at home.

Duplicate lists of the boys and girls, with postoffice address and kind of work undertaken, were sent to the congressman from our congressional district, and from three to five bulletins from the United States Department of Agriculture, indicated upon the list by number, were sent to each member. By this means there were distributed in the various farm homes of our county something like four thousand bulletins. Besides these, a number were received from the University of Illinois. Our teachers in most cases interested themselves in the work of the clubs, *alho no time was taken from the regular school program*. The county superintendent devoted some attention to the work

of the clubs during his annual visits last year, and it was not an unusual thing for the boys to bring into the schoolroom one or two ears of corn during the intermission period and ask for a corn talk. The county farmers' institute, in order to accommodate itself to the new order of things, took on new life, and by the assistance of a live local committee, secured about six hundred dollars with which to pay liberal premiums to the boys and girls for their work and meet other expenses of a great institute. The expectations of the farmers' institute management were not disappointed, for 377 boys brought out and exhibited corn, besides a large number who had other products, and more than fifty boys and girls exhibited poultry. The girls' department of plain and fancy needlework, cooking, and flowers was equally well represented.

Some very accurate descriptions of the raising and caring for the corn were presented, but this part of the work was somewhat neglected because there was not time to do clerical work necessary to make it succeed. Upon the whole, the boys' corn was a very fine exhibit. The two highest grades given by the expert judges were awarded to two boys under thirteen years of age.

I think several distinct things have been accomplished by the existence of these two clubs, among which may be named the following:

A general awakening of interest among the farmers, expression of which may be seen in many different lines. Some good seed corn has found its way into every nook and corner of our county. Of course, there are some who will adhere to the idea that the corn which has been grown for the past twenty years and which has run out in every particular except in size of ear, is good enough, but these are few. There are now seven hundred young corn judges who are able to make life miserable for the man who knows better than the seed man, especially when his product passes into the hands of the judges beside theirs.

It has transformed the farmers' institute from a moderately quiet affair, meeting in some obscure place and managing to spend the \$75 apportioned by the state for the purpose of conducting such institutes, into what is regarded as the great meeting of the year, furnishing an excellent program, which reaches the ears of an ever widening circle of interested farmers and housewives, and which paid last year for its program and premium list a little more than \$600.

Best of all, the boys and girls have been enabled to discover for themselves the value of wisely directed effort in the selection of seed and in the care and cultivation of their crops. They have seen, also, something of the reward of such effort, for some of them have been able to sell their corn readily for \$1.50 per bushel, while that of their parents brings the customary 40 cents.

It is in such ways as these that the enterprising country superintendent may stand as a middle-man between the experiment station and the children on the farms. In Cook County (Chicago) one of the assistant county superintendents, Charles W. Farr, during the month of April, 1905, held a series of ten "corn meetings," the announced purpose of which was to consider with the schools of an entire township, and the parents of the children: (1) The growth and fertilization of corn, emphasizing the possibility of breeding it with the same degree of care with which animals are bred; (2) to study thorobred ears of corn furnished for the purpose by professional corn breeders; (3) To consider samples of corn furnished by local farmers with reference to the selection of seed; (4) to encourage the boys to send for seed corn and enter the annual contest; and (5) by means of samples to set forth clearly the printed matter offered to the farmers by the state experiment

station. These meetings were well attended by old and young, and the most enthusiastic interest was awakened.

All this means more and better corn, of course. But it means much more. The attitude toward farm labor—all labor—is changed. The combination of intelligence with manual labor arouses a quality of interest which gives farming as an occupation, an even chance with other occupations to appeal to the boyish imagination at the time when he is beginning to think about his life work. Superintendent Farr is the author of a formula which tells the whole story. "Seed + Soil + Moisture + Heat + Boy = CORN."

The plan of organization and work of boys' experiment clubs and girls' home-culture clubs in Illinois, as described, has been adopted in a few localities in Ohio, Wisconsin, and Texas and possibly in other states.

The systematic study of the cultivation, breeding, and judging of corn carried on by the boys in Illinois, thru definitely organized effort, has made available for them and their fathers the results of the scientific investigation of this cereal, carried on by experts in the agricultural college of the state, and will add hundreds of thousands of dollars to the value of the yearly corn crop in Illinois.

All such work properly directed and organized is a move in the direction of awakening new interest and a practical intelligence in the affairs of the home and the farm. It reaches the parents and affects them in useful ways. Out of these experiments and activities will come an organized body of knowledge in form available for the teacher and for use in the schools of the country.

Such clubs may be organized in every state in the Union for specific work on the particular products of the locality, provided there are men and women in these states who will make a study of local needs and inaugurate lines of effort, which will appeal to the interests of the community under definite practical plans of organization.

AGRICULTURAL COLLEGE EXTENSION WORK IN NEW YORK

Some of the enterprises connected with the Extension Work of the College of Agriculture of Cornell University provide means whereby the public may be roused to an interest in industrial education. The nature-study work of that institution is an explicit movement in this direction. It was inaugurated some years ago as a propaganda to arouse the people of the state to the necessity of education by means of the common objects and affairs of the environment. Its purpose has been to relate the education to the actual daily life of the pupil. One of the enterprises of this nature-study work is the reading-course for teachers. Another is the organizing of children into "junior naturalist clubs." These children are organized in the schools through the teacher. Every year the clubs are reorganized, since the pupils go to higher grades, or leave school, or the teacher may change. These clubs are working nature-study units. The character of work that they chiefly take up is suggested each month by the *Junior Naturalist Monthly*. This lays out special

pieces of work each month and asks questions or suggests lines of inquiry which can be answered only by the pupils going directly to the objects themselves. The club members write letters or "dues" in their response to these suggestions. As showing something of the extent of the work the following figures may be given:

Up to March 27, of the present school year (beginning October, 1904) 446 junior naturalist clubs have been organized in the schools of New York state, with a total membership at that date of 13,525 children. At that time there had been received 934 sets of dues, containing altogether 20,718 letters, from the children. These children are mostly in the earlier grades. The subjects of these letters cover a wide range, although a few general subjects always stand out very prominently as the choice of the children, as the following figures show:

Letters on the horse.....	2,839	Letters on the Canada thistle.....	392
Letters on the pumpkin.....	3,382	Letters on the seed travelers.....	760
Letters on the squash.....	2,145	Letters on the silo.....	1,790
Letters on the dog.....	2,794	Letters on the woodpeckers.....	1,102
Letters on the chipmunk.....	1,659	Letters on the pine and hemlock trees	1,219
Letters on the alfalfa.....	983	Letters on the sumac.....	1,161
Letters on the soil.....	500	Letters on the cow.....	885

This and similar work has come to be an established enterprise in New York State and nature-study work and elementary agriculture are now to be provided in the syllabi of the state education department.

Another of the enterprises of the Cornell College of Agriculture are the farmers' reading-courses. These are designed for farm men and women. The reading season comprises the five months from November to March inclusive. Each month is devoted to a lesson. That is, five lessons are issued each year. Each lesson has a blank quiz or discussion paper which is to be returned to the Reading-Course Bureau of the College of Agriculture.

When one series is completed the reader takes another series the next winter. In the farmers' reading-course five series are now provided for (twenty-five lessons in all). In the farmers' wives' course three series are now provided for (fifteen lessons in all). These lessons are furnished by the College of Agriculture and the courses are free to residents of the state. Altho this reading-course enterprise is not designed primarily as a supplement to public-school work, it is nevertheless in the broadest sense an educational movement and in many ways affords a means of spreading the propaganda for nature-study and agricultural training.

For the week ending March 27, 1905, the number of persons reading in these two courses were as follows:

Farmers' Reading-Course:

Series I. Soil	2,582
Series II. Stock	3,524
Series III. Orchardng	1,238
Series IV. Poultry	1,282
Series V. Dairying	435 = 9,061

Farmers' Wives' Reading-Course:

Series I. Farm house and garden	6,056
Series II. Farm family	4,410
Series III. Sanitation and food	6,066 = 16,532
	25,593

The agricultural colleges can be a most important factor in suggesting the kinds of work best adapted to the local needs, and in furnishing in proper form the necessary information for carrying on the work successfully.

The committee believes that there should be connected with every agricultural college in the land at least one man charged with the duty of organizing in pedagogic form such results of experiment work as can be brought within the comprehension of the farming population, old and young, and profitably utilized by them. He should also be the representative of the agricultural college in the field among the farmers. He should organize efforts to bring this knowledge to their attention and to have it applied for economic results. Thru properly established relations with the state and county superintendents, farmers' institutes, the Grange, and such other agencies as are available, he should undertake to secure the organization of the boys' and girls' clubs and of clubs of farmers, and farmers' wives, for practical study and experiment in definite lines of production work, and for the reading of matter of practical value in the concerns of the home and farm.

PATRONS OF HUSBANDRY

The Patrons of Husbandry affords one of the best means of bringing the need of industrial education to the people. The Grange is established on an educational basis, and has officers and committees whose duty it is to keep the order informed on questions of public interests. In New York, the State Grange has established scholarships in the College of Agriculture of Cornell University. Subordinate granges are always ready to discuss questions concerned with the betterment of the rural schools.

CHILDREN'S WORK AT FAIRS

There is good opportunity to interest the teachers of the schools and the general public in the nature-study and agricultural work by means of exhibits at the town, county, and state fairs. The drawings, specimens, collections, and essays that result from work in the schools make very attractive exhibits. At the county fair in Bath, Steuben county, N. Y., the children's work has been a prominent feature for a number of years. There is a children's day, on which children are admitted either free or at a very small price, and special

arrangements are made to have their exhibits on view. Expert judges are secured to award prizes for the essays, collections, plants, and the like. The children of the public schools of Syracuse, N. Y., and vicinity have made a very creditable exhibit for a number of years at the state fair. They fill a fifty-foot tent with the plants of their growing. The nature-study bureau of the College of Agricultural of Cornell University has sent letters and circulars to the managers of the county fairs, urging them to offer on their premium lists small sums for the products of children's gardens, for collections of named grasses, and in a few instances for weeds. During the fair season it is the purpose to keep in touch so far as possible with these various displays by speaking to the children and inspecting their exhibits. The most popular exhibits are expected from village schools having a principal and teachers who are especially interested in this kind of work. Similar effort to interest the rural-school pupils and teachers in making a showing of their work at county and state fairs, and to interest the people in the educational work of their children is made in other states and should be encouraged everywhere under proper control and guidance.

APPENDIX A

THE DUNN COUNTY SCHOOL OF AGRICULTURE AND DOMESTIC ECONOMY

HISTORICAL STATEMENT

In 1899 the Wisconsin legislature appointed a commissioner to investigate and report upon the methods of procedure in this and other states and countries in giving instruction in manual training and in the theory and art of agriculture to the public schools.

Among the recommendations in that report was one for the enactment of a law authorizing counties to establish secondary schools of agriculture and domestic economy. The legislature in 1901 enacted a law providing for such schools and proffering state aid to the first two schools thus organized. In 1902, two schools of this class were established; one in Menomonie, Dunn county, and the other in Wausau, Marathon county. There was a good attendance at the opening of each school which has steadily increased each year.

The legislature of 1903, increased the number of schools entitled to state aid to four, increased the amount of aid in each case, and authorized two or more counties to unite in establishing and maintaining a school.

COUNTY AGRICULTURAL SCHOOL LAW

The following is an outline of the Wisconsin law creating and assisting county schools of agriculture and domestic economy. (Chapter 288 of 1901, as amended in 1903.)

Sections 1, 2 and 3 create the schools of this class and provide for county school boards of three members.

Sec. 4 allows two or more counties to unite in one school.

Sec. 5 makes the county treasurer the school treasurer.

Sec. 6 names branches to be taught.

Sec. 7 requires a plot of three acres for farm practice.

Sec. 8 makes the school free to students in any county helping to support such school.

Sec. 9 makes the state superintendent also superintendent of such schools.

Sec. 10 provides for list of four such schools when approved by the dean of the College of Agriculture and the state superintendent. Cost of maintaining a school is to be reported to the State Superintendent. School must be maintained eight months. The state shall pay each county maintaining such school "a sum equal to two-thirds the amount actually expended for maintaining such school during the year, provided that the total amount so apportioned shall not exceed \$4,000 to any one school in any one year."

POSITION OF SCHOOL IN STATE SYSTEM

The chief purpose of the county agricultural schools, as now established in Wisconsin, is to popularize agricultural education more than can be done by a well-filled state college. The schools are subordinate to the state college in that they are not so advanced, especially in their academic subjects. Students are admitted directly from the rural schools. Most of them would never go to an agricultural school, if this new class of schools were not brought close to them. Some students board at home and help with home chores, others visit home at the end of each week and are dominated by the home spirit thruout their school life. Certainly these county schools in Wisconsin reach a class of pupils that would not feel that they could spare the money necessary to attend the State Agricultural College. And yet there are students, who, after getting the work of the county school, will feel like continuing their education and will attend the State College of Agriculture. Several graduates are already planning such a course. More county schools of agriculture will help fill the State College of Agriculture to overflowing.

GENERAL EQUIPMENT

The Dunn County School of Agriculture has three buildings located on a half block in the center of Menomonie, the county seat. Here there is still room for poultry runs and a small garden for girls' practice. Philanthropic citizens and the city gave these grounds to the school. The school farm consists of six acres located on the county fair grounds nearly one mile from the school. Here the boys of the school have practice in farm, orchard, and nursery work. The area may be increased from time to time.

BUILDINGS FOR THE AGRICULTURAL SCHOOL

The school has the use of four buildings:

The main building is 42 by 96 feet, three stories high, built of brick. The first and second floors are devoted to the uses of the School of Agriculture and the third floor to the County Teachers' Training School. A glass wing 30 by 30 feet is used for greenhouse purposes.

The mechanical building is 24 by 50 feet, two stories high over a high bank basement.

The horticultural building is 28 by 50 feet, two stories high over a bank basement. The basement story is what gives the building its name, as it is used for potting of plants, grafting and budding lessons, winter storage of cions, roots, bulbs, and tender plants.

The farm tool house, built by students, is 14 by 16 feet, one story high.

The carpentry and blacksmith shops are supplied with the best of tools, substantial and handy benches (made by students), forges, anvils, vises, lathes, circle saw, steam engine, gasoline engine, etc. The sewing department has its cutting tables, work tables, sewing machines, tracing boards, and wardrobes. The kitchen equipment, of utensils, dishes, tables, cabinets, ranges, food sets, cupboards, sink and refrigerator, is complete in every detail. The laboratory is provided with apparatus necessary for chemistry, physics, plant life, and soil experiments. Facilities for stereopticon illustration are provided. Machinery and tools for use on the farm and garden are of the most modern types.

The equipment in the dairy includes cream separators, Babcock testers, combined churn and worker, ripening vat, milk heater, scales, and complete set of utensils.

Poultry quarters are constructed on model plans of economy and cleanliness. The department is supplied with two incubators and two brooders. Brooders were built by carpentry students. The best types of farm poultry are kept.

In regard to building and equipment it should be remembered that for the amount which the county has expended it has two young institutions established, viz., the Agricultural School and the County Teachers' Training school. Much has been saved by building for two schools at the same time.

The entire property of the two county schools (Agricultural and Teachers') has cost the county \$23,035. But the total valuation of the property including the small farm is \$39,103.85. The difference is made up largely by gifts from manufacturers and citizens, and by articles made by students in the School of Agriculture.

COST OF RUNNING THE SCHOOL

The state law authorizes any county (not to exceed four) to build and equip a school of agriculture and pay the running expense for one year. After that the state will pay two-thirds of the annual cost of maintaining the school—not to exceed \$4,000 for each school. Experience of two years shows that the annual running expense is about \$6,000, two-thirds of which is paid by the state and only one-third by the county.

The assessed value of taxable property in Dunn county is about \$10,500,000. Any person with an assessment of \$100 will pay less than two cents to support the school. Property assessed at \$1,000 requires a payment of less than 20 cents a year, to run this school. Thus it is seen that the annual cost is almost nothing to the individual tax-payer in the county.

When such are the facts, all who may have had some fears regarding the matter of annual cost may feel at ease; for surely a county in an agricultural region can easily support its own "farmers' school."

CORRELATIVE LINES OF WORK FOR FARMERS AND TEACHERS

Much agricultural information is disseminated from the Agricultural School to the farmers of the county. Directions for planting, suggestions as to varieties, combating noxious weeds, helping establish co-operative creameries, planning barns, silos, school-houses, dwellings, devising ventilators, selecting stock, and many other subjects are taken up by the instructors with individual farmers. The school has done a great deal of milk- and cream-testing for farmers for the purpose of helping to improve dairy herds. On the school farm such new crops are tried as should be used by those living in the section. Many hundreds of bulletins on special farm topics have been placed in the hands of farmers desiring information on these subjects.

A novel feature of the school's work in Dunn county is the introduction, thru the rural teachers, of elementary agriculture and manual training into district schools of the county. By an interchange of classes with the County Teachers' Training School the Agricultural School teaches the rural teachers to handle these subjects in their school in a very creditable manner.

CHARACTER OF THE INSTRUCTION

In all the instruction in the Dunn County School of Agriculture the useful side of the knowledge and training given to the students is emphasized. This is the principle on which the school is founded. The extended knowledge which the farmer must have should be made as practical as possible. At every point the school is made to co-operate with the farm, the shop, the dairy, and the home. The manual-training courses are made far more practical and useful than such courses usually are. Nearly all of the time of the classes has been engaged in making articles of use on the farm, in the home, in the school and shop. The same feature of useful training has prevailed in domestic economy, plant life, farm accounts, study of soils, poultry, and in fact all subjects.

SCHOOL ATTENDANCE

The Agricultural School continues growing in numbers and usefulness. While the attendance is not so great as we may reasonably expect it to be in a few years it is better than the highest expectations of its warmest friends.

The total enrollment the first year was 64—40 young men and 24 young women. The average age of all was nearly 18 years. The second year the enrollment reached 79—45 young men with an average age of 18½ years, and 34 young women with an average age of 19. Eighty-five per cent. of the students are from the farm, and all are preparing for life on the farm.

ATTITUDE OF STUDENTS

To show the attitude which the students in the school have toward it, the following question was asked: "Why should rural young people attend the Dunn County Agricultural School?"

A few of the answers may be of interest here. "In sewing one may learn to make her own garments." "We can learn good housekeeping, sewing, laundering, how to plan a house, how to work quickly and quietly." "We learn a great deal about the food value of different food materials, and the right way of cooking foods." "It offers the most practical course in domestic economy of any school I could find." "We learn the effect of diet upon the health, and how to prepare foods in the most healthful manner." "We learn the easiest, quickest, and best way to do our work." "I love housework, and by attending this school I have learned many things that will make it easier; also many ways to economize time, strength, and money." "Attending this school has made me more interested in all work."

"I have learned the care and use of all tools used by the farmer." "In my opinion it prepares students for a much more pleasurable and prosperous life." "To secure practical training in blacksmithing and carpentry."

"I came here because I know that I will become a better farmer and American citizen by it." "It is necessary for the future farmer to have a course in such a school to enable him to be the most successful farmer." "It teaches how to farm with success, how to keep a farm in good order; what crops pay the best, and what ones are the hardest on the land." "I have learned how to run an engine; the proper care of milk and cream, and how to make good butter." "The school has helped me to secure twice the wages I could get before." "We learn that a farmer's life and work is not all drudgery."

The graduates of the school are all following agricultural pursuits and are in all cases putting into practice many of the things they learned while in school. This is a good standard from which to measure the success of the school.

County schools of agriculture cannot be a success unless the farmers of the vicinity take an abiding interest in them. The experience in Wisconsin shows that the farmers look upon these schools with much favor. They are proud of them. A farmer will speak of the school as "the farmer's best friend," "the best place to send our boys," "the college for the rural classes," and in such complimentary ways only.

REGULAR COURSE OF STUDY

The regular course covers two years of eight months each, beginning in October and closing in May.

YOUNG MEN: FIRST YEAR

First Term: Work with Soil, *5; Carpentry, d. 5; English and Library Reading, 5; Business Arithmetic, 5.

Second Term: Soils and Fertilizers, 5; Dairying, d. 2; Carpentry, d. 3; English and Library Reading, 5; Farm Accounts, 5; Rural Architecture, d. 2.

Third Term: Plant Life, 5; Vegetable, Flower, and Fruit Gardening, 5; Poultry, 3; English and Library Reading, 5.

*The numerals denote the number of recitation periods per week; d. signifies double period.

SECOND YEAR

First Term: Plant Life, 5; Blacksmithing, d. 5; Economic Insects and Diseases, 5; English and Library Reading, 5.

Second Term: Animal Husbandry, 5; Blacksmithing, d. 5; United States History, 5; English and Library Reading, 5.

Third Term: Animal Husbandry, 5; Vegetable, Flower, and Fruit Gardening, 5; English and Library Reading, 5; Civil Government, 5.

YOUNG WOMEN: FIRST YEAR

First Term: Cooking and Sewing, *d. 5; English and Library Reading, 5; Business Arithmetic, 5.

Second Term: Cooking and Sewing, d. 5; Home Economy, 5; English and Library Reading, 5; Laundry, 2.

Third Term: Cooking and Sewing, d. 5; Plant Life, 5; Poultry, 3; Hygiene, 5; English and Library Reading, 5.

SECOND YEAR

First Term: Cooking and Sewing, d. 5; English and Library Reading, 5; Economic Insects and Diseases, 5.

Second Term: Cooking and Sewing, d. 5; Chemistry of Foods, 5; United States History, 5; English and Library Reading, 5.

Third Term: Cooking and Millinery, d. 5; Home Nursing and Emergencies, d. 2; Vegetable, Flower, and Fruit Gardening, 5; English and Library Reading, 5; Civil Government, 5.

WINTER TERM SHORT COURSE

There are large numbers of young people who, from lack of means or time, are unable to take an extended course of study, but whose usefulness in the world would be much increased by a little special training. Their earning capacity in the household or on the farm is far from what it might be. The winter short course at the Agricultural School is for the benefit of such persons. The short course is primarily intended for persons of advanced age, and younger pupils should plan to take the regular course. The complete short course covers two winter terms, twelve weeks each, beginning in January and ending in March.

The following are the subjects:

For men, first winter: Science of Agriculture, Farm Accounts and Commerce, Dairying, Farm Carpentry, English.

For men, second winter: Feeding and Care of Stock, Soils and Fertilizers, Farm Blacksmithing, Rural Architecture, English.

For women, first winter: Home Economy, Cooking, Sewing, Laundering, English.

For women, second winter: Cooking, Sewing, Millinery, Personal and Domestic Hygiene, English.

REQUIREMENTS FOR ADMISSION

In order to pursue the work of the regular course, students should have a common school education. Young people thru with their country school may enter this school. Persons in doubt as to their ability to enter are urged to write or call on the principal of the school. Application for admission to the school should be made in advance by writing to the principal of the Agricultural School, Menomonie, Wis.

TUITION FREE

Tuition is free for students living in Dunn county, and at present the amount charged for students from other counties is only ten dollars per year if paid in advance, or if paid by terms is as follows: Fall, \$4; winter, \$5; spring, \$3. Books are rented by the school at the rate of 25 cents a month for all a pupil needs.

COST OF LIVING

The cost of living near the school is very little greater than the cost of living at home. Students find board and rooms in private families at prices ranging from \$2.50 to \$3.25 per week. Students often furnish their own rooms from home and board themselves for about \$1.00 or \$2.00 per week or less.

* The numerals denote the number of recitation periods per week; d. signifies double period.

OUTLINES OF SUBJECTS AND METHODS

SOILS AND FERTILIZERS

This course includes the nature, function, origin, and wasting of soils; texture, composition, and kinds of soil; humus of the soil; soil moisture and its conservation; capillarity, solution, diffusion, and osmosis; soil temperature; relation of air to soil; physical effects of tillage and fertilizers; sources of loss of the elements of fertility; function of manures and fertilizers; nitrogenous fertilizers; potash; phosphates; purchase and use of fertilizers; particular needs of special crops. The work of the course is supplemented by the examination of many kinds of soils and subsoils, samples of fertilizers, and an examination of results obtained in various experimental tests.

In the study of soils the classes use text-book and laboratory methods. The physical laboratory serves as a suitable place for considerable soil work. This is supplemented by experiments in the greenhouse and in the grafting room. Numerous experiments, such as those suggested in Chapters I to VI of Bailey's *Principles of Agriculture* are performed by classes.

POULTRY RAISING

Poultry quarters are constructed on model plans of economy and cleanliness. The department is supplied with facilities for artificial incubation and brooding. Brooders were built by carpentry students. Bone and meat grinders were given by manufacturers.

The best types of farm poultry are kept. A term of lectures on poultry raising rounds out the practice work in this subject.

Some of the topics considered are: Planning, arrangement, and building of poultry houses and runs; characteristics and special uses of the various leading breeds of poultry; breeding, feeding, and management of fowls for eggs and for market; managing incubators and brooders.

INSECTS AND DISEASES

Losses due to insect life; transformations; economic bearing of insects with biting and with sucking mouth-parts; careful study of the worst insects of the farm, garden, orchard, and household. Both injurious and beneficial insects are studied from life and from specimens in the laboratory. There is considerable practice in making and using spray materials, such as emulsions, poisons, and fungicides. These are applied in the greenhouse, gardens, and private plantations. Students thus become familiar with different forms of spraying apparatus. The most important plant diseases of the northwest are studied with a view to checking their ravages.

SCIENCE OF AGRICULTURE

For short-course students the subject matter varies only a little from the winter term work in the regular course. This avoids a multiplication of classes. One subject given only to the short course students (men) covers the general science of agriculture in a broad way. A suitable text is used in this class, and a number of reference books are used by means of a topical method of recitation.

DAIRYING

Thoro instruction in the care of milk, cream, and utensils; principles involved in creaming milk by gravity and centrifugal processes; full instruction in regard to running farm separators and the manufacture of butter. Students receive practical training in the ripening of cream, churning, working, and packing of butter, testing the value of milk and cream by the Babcock method.

This practice is carried on in a well-equipped dairy, containing cream separators, Babcock testers, combined churn and worker, ripening vat, milk heater, scales, and complete set of utensils. Students run a boiler and engine in operating the machinery. The sloping cement floor and brick walls make the creamery quite sanitary and modern. Milk is bought from farmers who haul it to the dairy, and the butter is sold at the highest market price to local customers and stores.

The purpose is to give young men very thoro training in those lines of the business as will serve to make them better creamery patrons, and teach them to furnish the products of the highest quality, and conduct the dairy herd with the greatest profit. Students wishing to become butter makers take additional work in the subject—in figuring income of creamery, cream checks for patrons, overchurn, and other mathematical work. Advanced students are given additional practice in handling starter, making butter, and all details of the business. Inspection trips are made to some of the best creameries of the county.

PLANT LIFE

1. This work begins with elementary nature lessons from plant life. This leads readily to studies in regard to how plants grow, how they feed, their effect on the soil, lessons in pollination, germination, natural and artificial methods of propagation, as layering, grafting, budding, and by cuttings. Lessons are given in plant physiology with experiments in the laboratory. In the study of plant life very little of the old-fashioned botanical work of the high school is taken up. No technical, systematic botany is introduced, but the characteristics of the families of plants which are of greatest economic value are considered. Much field work is included in the course.

2. Studies of varieties for cultivation; comparative values for marketing, for feeding, and for fertilizing fields; studies in grasses and other forage crops; corn, wheat, and other recently improved grains; best methods of harvesting, curing, preserving, including use of silo and shredder; methods of marketing, etc. Plants of the market garden receive special attention. Students become familiar with the most common weeds and how to combat them.

RURAL ARCHITECTURE AND DRAWING

Mechanical drawing is practiced in the shop and class room, where working drawings are made for use at the carpenter's bench, or to be followed in the construction of dwellings, barns, granaries, silos, poultry houses, machine sheds, cupboards, cases and other indoor structures. Students are encouraged to plan buildings and other structures that are needed on their home farms, and to make lists of material showing cost of same, and cost of construction.

PRINCIPLES OF PHYSICS

A brief time is given to experiments in the laboratory, teaching those principles of physics which are most applicable to farm practice, such as heating, lighting, ventilation, water supply, friction and lubricants, principles of pumps, eveners, pulleys, and engines.

ELEMENTS OF CHEMISTRY

A short study is made of the more common chemical elements and their chief compounds. For the young men these lessons lead up to the study of the composition of soils, fertilizers, and feeds. For the young women the elementary chemistry forms a groundwork for the chemistry of foods.

FARM ACCOUNTS AND COMMERCE

A very small proportion of farmers in the west keep farm accounts. A very thorough course in this subject has been worked out for this school. The students formulate accounts in books suitable for home use, in all subjects found dealing with farm work of today. A brief study of commercial law of importance to farmers is taken up. Business forms, contracts and land survey are studied; making of inventories; memorandum forms; time books; accounts with grain crops; stock accounts; purchases and sales; notes payable and receivable; cash accounts; other farm accounts, and practice in keeping same; plans and purposes of co-operative and other economic organizations.

BUSINESS ARITHMETIC

Review of fractional forms, measurements of wood, walls, land, tanks; compound and denominate numbers; special computations suited to farm practice, such as income from dairy cows, feed rations, cost of buildings, cost of fencing, cost and contents of silo, silage and other feed needed for a herd. The work prepares the pupils for better understanding of operations in farm accounts class.

VEGETABLE, FLOWER, AND FRUIT GARDENING—FARM PRACTICE

This includes the principles of gardening of vegetables, flowers, and fruit; garden tillage; irrigation; rotation of crops; structure, use, and care of hotbeds; seed-testing; protection from frosts. Practice is given in the growing of various garden flowers and vegetables. Six acres of land are provided on the county fair grounds for classes in this course.

Farm machines of the best types are freely given by manufacturers for advertising purposes. A few necessary tools purchased by the school make the farm equipment quite complete in this line.

On the farm a number of new crops are being tried. A good nursery of several thousand trees is started by the students. Such leguminous crops as alfalfa, soy beans, cowpeas, vetch, field peas, and alsike clover are being tried to illustrate their value in improving soils as well as in producing forage for stock.

The students are taken to orchards in the county for practice in pruning, and to the best small-fruit and other plantations to study methods of culture and management. (See also notes on stock feeding and care.)

ANIMAL HUSBANDRY

The work in this subject is chiefly divided into two terms' work under the subject of "Feeds and Feeding" and "Care of Animals." The study is made very practical by trips to the best farm barns in the county, to learn methods of housing, feeding, and handling, by careful examination of many sound and unsound animals of all kinds. Considerable stock judging is carried on by classes in connection with the subject. Students become very familiar with all types of farm animals—beef and dairy cattle, light and draft horses, lard and bacon hogs, mutton, and long-wool sheep.

The best stock men in the section are invited to address the classes. An expert veterinarian gives a series of practical talks to the classes, which are of immense value.

Care of Animals.—Care of animals in stables and yards; judging for age; unsoundness in horses; training and breaking colts; treatment of balking, rearing, runaways, pulling on bit; causes and cures of lameness such as laminitis, corns, and shoulder troubles; study of pulse and temperature; giving medicine, use of enemas, counter irritants, anesthetics, disinfectants, antiseptics; treatment of wounds, abnormal growths; dehorning, castrating; studies in breeding and attendant troubles; diseases of bones, such as bone spavin, ring-bone, side-bones, big knee, splint, dislocations; bog-spavin, wind-puffs, curb, knee-sprung; diseased teeth; impaction of rumen; colic in horses, scouring, constipation; diseases of breathing and nervous system, and skin; such parasites as lice, scab, mange, bots, worms; such diseases as glanders, blackleg, abortion, tuberculosis, cholera; azoturia; poisonous foods and their antidotes.

Feeds and Feeding.—Feeding farm animals, as the horse, fattening steer, dairy cow, dairy calf, veal, fattening sheep, young lambs, pigs and fattening hogs; special studies, such as influence of wide and narrow rations when fed to milch cows; studies of special feeding experiments; attendant care and management for rearing lambs, calves, colts, and pigs.

Feeding stuffs: Study of composition and feeding; value of leading feeds and special feeds of the farm; importance of leguminous plants for green forage and hay; special influence of feeds; study of feed tables and figuring rations for farm animals.

GARDENING FOR WOMEN

Theoretical instruction and practical application; making and maintaining a farm garden; seed testing; germination percentages; planting record; construction and use of hotbeds; soil temperature; transplanting, potting, and repotting; garden plans; staking and labeling; handling of produce; marketing; methods of propagation; gardening for home consumption; gardening for profit.

A suitable area for gardening purposes lies between the agricultural school buildings and gives abundant opportunity for practical work by the young women of the school. All kinds of profitable garden crops are raised. A new greenhouse, heated by hot water, furnishes means of teaching the propagation of house plants in cold weather.

FARM BLACKSMITHING

How to fashion from stock iron various articles useful on the farm, such as tongs, cold chisels, punches, rings, chain links, clevises, brackets, harrow teeth, etc.; how to use and take care of files; how to construct a serviceable forge and to otherwise equip a shop for farm blacksmithing; original exercises in repairing broken parts of farm machinery; something of the nature and structure of different kinds of iron and steel, as well as some knowledge of the processes by which each is produced. Especial attention is given to the process of welding iron and steel, and of tempering tools of steel. Some attention is given to mixing and putting on paints; repairing tinware; care and operation of engines and other farm machines.

The blacksmith department is equipped with portable forges, anvils, and a few simple blacksmith tools for each student. All the work is of a very practical nature.

Incidents of the manual-training work are the operation of steam and gasoline engines, motors, and other farm machines; renovating and repairing dilapidated machinery. Students and farmers are encouraged to have farm shops of their own.

FARM CARPENTRY

Instruction in carpentry is given in the workshop and includes the following: How to care for, sharpen, and use in a practical way such ordinary carpenter tools as should be used on a farm; work on models that will teach how to make the different kinds of

joints, splices, etc., necessary in the construction of buildings, machines, cupboards, and a variety of useful and ornamental articles for the home; the construction, in miniature, of parts or a whole of different buildings, demonstrating principles and methods employed. Each member of the class will make, during the course, a number of useful articles that he may take home with him by paying the mere cost of material. Splicing and tying ropes is given the boys in this class.

The carpentry is not mere manual training, as taught in high schools. It is "farm carpentry." After the necessary preliminary work the students soon learn the construction of buildings, machines, cupboards, paper racks, mail boxes, match holders, milk stools, book cases, and a variety of useful and ornamental articles for the home and farm. In the Agricultural School the classes in carpentry have ceiled and done the interior finishing of the poultry department, and the gymnasium. They have made the work benches and tool racks for the carpentry department, and hardly a week passes without showing the completion of a number of articles for school use. The farm tool house was built by the students. The carpentry department is equipped with such tools as should be used in farm shops. Equipments too elaborate for use on any farm would have a detrimental influence upon the students. Simple, plain tools of the very best quality are used. Besides the bench tools some power machinery is available for advanced students.

COOKING

The cooking department is equipped as nearly like a home kitchen as is consistent with the number of students to be accommodated. Wood and gasoline ranges are used instead of individual gas plates. Convenient cupboards and kitchen cabinets are such as should be in any well equipped home. Even the work tables used by the pupils are models of convenience in every respect. Food sets, showing the composition of each of the standard foods, are conspicuously placed for constant reference and study in the preparation of meals. Students get practice in preparing and serving meals to each other and to numerous visitors.

The course in cooking includes a study of starchy foods, potatoes, cereals; quick breads, and other flour mixtures; a study of the yeast plant and its action; bread-making; vegetables; cream soups; meats, their food value and methods of cooking; soups; desserts; planning cooking, and serving simple meals.

During the second year dietetic values of foods are taken up, and each student plans a meal correctly balanced as to food nutrients, and serves it to the class. Numerous special foods are prepared by the class covering subjects of the first year in a more advanced way. The classes prepare foods for outside orders and food sales such as cakes, breads, candies, and desserts. They prepare and serve at banquets, parties, institutes, and other gatherings.

CHEMISTRY OF FOODS

A study of oxygen, nitrogen, hydrogen, carbon, carbon-dioxide; composition of body; composition of foods; sugars; starches; fats; protein; mineral; digestion of various food stuffs; adulteration of foods; bacteria and molds; preservation of foods.

This work is given chiefly by means of laboratory experiments, the students working upon and analyzing food stuffs.

INVALID COOKERY

Invalid cookery is taken up as a special branch of the work in cooking. The value of absolute cleanliness and daintiness in serving in invalid's tray with its effect upon the patient is taught; special diet for fevers and other individual cases; the making of gruels, broths, and other dainty and nutritious dishes; special diets for convalescents.

SEWING

The sewing department is equipped with sewing machines, draughting tables, and everything necessary to teach the girls the best methods of making their own garments. They furnish their own material and use the finished products. They make underclothing, shirt waists, skirts, wool dresses, and children's dresses. The students become skilled both in hand and machine work.

The course is divided as follows: (1) Draughting, cutting and making by machine suits of underclothes, cotton waists, and dress skirts. (2) Draughting, cutting, fitting, and making wool waists, unlined wool skirts; children's ornaments.

MILLINERY

The millinery, like the other practical work of the course, is not intended for professional use. The aim is to cultivate simplicity of taste and teach making the best use of materials and means at hand.

The course includes the making and trimming of hats and bonnets; study of the harmony of colors; discussion of taste in selection of bonnets, hats, plumes, frames, tips, flowers, trimmings; the renovating and use of available material already on hand.

HOME ECONOMY

The course in home economy is designed to cover the broad field of the home left untouched by the special branches like cooking, sewing, and laundry work. An outline of the work is as follows: The house plan, drainage, sanitation, ventilation, heating, and lighting; household furnishings and their care; house-cleaning and sanitation; cleaning and preservation of clothing, carpets, rugs, and floors; household accounts; use of bank accounts and check books; relation of income to expenditure.

Charts and drawings are used; visits are made to dwellings with model features; good features of modern homes are discussed by members of the class.

HOME NURSING

The lessons in home nursing are to meet the need in so many homes where the care of a sick one devolves on the family. A professional nurse is not always obtainable and not always necessary, but a knowledge of what to do and how to care for a patient intelligently is of great value to every woman.

The course includes care of sickroom and bed; duties of nurse; care of patient; precautions in contagious diseases; disinfection of patient and room; special diets for the sick; nursing of special diseases; diet for children.

EMERGENCIES

The aim of this course is to give students the knowledge that every man and woman ought to have, of what to do in cases of accident while waiting for a physician. The work is given by means of lectures with occasional illustrations.

The course includes circulation of the blood; hemorrhages and how to stop them; treatment and dressing of wounds; bandaging; artificial respiration; unconsciousness; poisons and their antidotes; fractures and sprains.

LAUNDERING

A well-equipped modern home laundry is used to teach the principles of laundering. Special attention is given to the removing of fruit and other stains, and disinfecting; special treatment of flannels, silks, prints, and laces; fixation of colors; composition and action of various soaps, soda, bluing, borax, and washing powders; making and using cold and boiled starch; care and use of irons; polishing devices.

Each lesson is made practical by laundering material selected for the occasion.

HYGIENE

Kinds of respiration and changes produced by respiration; clothing as it affects health; function of the skin, and necessity for cleanliness; bathing; exercise and rest; general causes of diseases; infectious diseases and prevention of their spread; digestion and assimilation of foods; diseases due to improper nutrition of the various tissues; quantity of food required for heat, energy, and tissue.

The class uses the school laboratory. Demonstrations are given with microscopes, digestion experiments, models, and charts.

CIVIL GOVERNMENT

The practical application of the provisions of the state and federal constitutions are studied with a view of making all students more valuable as citizens. Township and county governments are studied in some detail.

UNITED STATES HISTORY

The subject is reviewed and detail studies made of the progress of the country with text and reference books, during the second year of the course.

ENGLISH AND LIBRARY READING

These two subjects are taken together. The work in English is adapted to the needs of the classes, but attention is given to correct expression and usage rather than to exhaustive study of technical grammar. Literary masterpieces are made the chief foundation for English study. Library books are read by all students, and all are urged to read several good books each term. The selection of books is approved by teacher in charge. Reports of this reading are made in class.

APPENDIX B

THE MINNESOTA AGRICULTURAL HIGH SCHOOL

ITS PURPOSE

It is the aim of the School of Agriculture to train its students to become useful citizens as well as good farmers and housewives.

The home life of the students at University Farm is supervised by members of the faculty, and it is the aim to provide such interests outside the regular school work, as will assist in rounding out the characters of the young men and women. Literary societies afford opportunities for experience in writing, public speaking, and debate. The faculty assist at the receptions and social gatherings which provide social pleasures and experience. In the work of the Young Men's Christian Association and the Young Women's Christian Association there are opportunities for training in co-operative religious activity. Student and alumni clubs, and organizations, and a progressive periodical, *The Farm Students' Review*, published by the alumni, aid in teaching the students how to work for the betterment of agricultural conditions.

The school of agriculture offers a practical course of study designed to fit young men and young women for successful farm life, and it serves as a preparatory school for the college of agriculture.

For the young people who cannot pursue the full college course the school supplies a training in the general branches, supplementary to the grammar school work, and a thoro course in the leading branches of agricultural knowledge, put in practical form, by means of the constant application of lessons in the field, laboratory, or workshop. The methods employed are always practical. The teaching is so conducted as to educate the students toward the farm, and to develop in them a love for farm life, by showing them the possibilities of such a life. The school has been successful in this respect, and over eighty per cent. of its graduates take up agricultural occupations upon leaving the school.

The details of this work, the division of the time for the various subjects, and the range of work required of the students, will be found outlined in the following pages.

Thru the endowments and appropriations, of state and national government, the school is maintained without tuition charge, except an entrance fee of \$5 to residents and \$10 to non-residents, and the co-operative arrangements are so conducted that the students are able to secure excellent board at low rates.

The young men and women of the state, who desire to become farm home makers, are cordially invited to enter the course at the school of agriculture. They are urged to come with suitable preparation—that is, the complete mastery of the common school branches; previous farm experience; and to come with the intention to do earnest and conscientious work.

ADMISSION

All male students are required to have had six months farm practice before entrance.

Applicants for admission will be examined in English grammar, arithmetic, history of the United States, and geography, unless they present state certificates, or approved county diplomas, showing that they have completed the eighth grade work in these subjects. Students from the city or village schools will not be admitted unless, in addition to the above requirements, they present certificates from the principals of such schools showing completion of eighth-grade work and honorable standing in deportment. Applicants whose home schools do not afford complete instruction in these common branches, may be admitted with not more than two conditions, which must be removed, according to instructions given the student upon admission. State High School Board certificates are accepted for work in English, physiology, algebra, geometry and civics.

Students applying for admission after the opening of the term will, in addition to the regular entrance examinations, be required to show proficiency in the work done by the class up to the time of their application. Those who cannot enter by the first of November should wait until the beginning of the winter term.

FEES

With the exception of an entrance fee of \$5 to residents, or \$10 to non-residents, the school makes no charge. All other expenses are arranged by co-operation of the students.

EXPENSES

The school expense for the year does not exceed \$85. This amount does not include the cost of the required military suit for boys, traveling or personal expense.

The cost to the student for board, heat, light and laundry is the actual cost of maintaining the table and caring for the house. This does not exceed \$3 per week. The school year covers a period of twenty-four weeks.

REQUIREMENTS FOR GRADUATION

First, the completion of the prescribed course of study with an honorable standing in deportment.

Second, an essay of not less than one thousand words upon a topic connected with agriculture or home economics.

Third, for young men, a practical experience in field work at the University farm or elsewhere, as shall appear in reports received from responsible sources.

COURSE OF STUDY

FIRST (C) YEAR: FIRST TERM

Agricultural Botany [5]		
*Drawing [2]		
Music		
English [5]		
*Blacksmithing [2½]	} or {	*Laundering [2]
*Carpentry [2½]		Physical culture [2]
Military drill [2]		*Sewing [3]
Agriculture [3]		Social culture [1]
Gymnasium [1]		Field agriculture [3]

SECOND TERM

Agricultural botany [5]		
*Farm accounts [2½]		
Music or literary society work		
Comparative physiology [5]		
**Study of breeds [4]		
*Carpentry [2½]	} or {	†Cooking [2]
*Drawing (farm buildings) [2]		*Drawing (farm houses) [2]
*Blacksmithing [2½]		Physical culture [2]
Military drill [2]		
Breeds of horses [1]		
Gymnasium [1]		

* Figures in brackets indicate the number of hours per week in which the subject is pursued. All work in subjects marked thus* extends through double time in the daily program.

† Three periods.

** Work outside of class not required.

SECOND (B) YEAR: FIRST TERM

English [1]		
Agricultural physics [5]		
Dairy chemistry [2]		
*Dairy husbandry [2½]	{	Dairy lectures
		Dairy practice
		Dairy breeds
Fruit growing [3]		
Music		
Farm mathematics [5]		
*Stock judging [1]	} or {	*Cooking [2]
Breeding [2]		Household art [1]
Military drill [2]		Physical culture [2]
Gymnasium [1]		*Sewing [2]

SECOND TERM

	English [1]	
	Agricultural chemistry [5]	
Dairy husbandry [2½]	{ Dairy stock lectures	
	{ Dairy practice	
	{ Dairy-feeding	
	Music	
	Agricultural physics [5]	
	Vegetable gardening [3]	
Field crops [5]	} or {	*Cooking [2]
Military drill [2]		Home management [1]
Gymnasium [1]		Physical culture [2]
		*Sewing [2]

THIRD (A) YEAR: FIRST TERM

Agricultural chemistry [7]		
Forestry [3]		
Music, Chorus, and Quartettes		
Entomology and zoölogy [5]		
Poultry [3]		
Algebra [5] Optional		
Handling grain and machinery [1]	} or {	*Cooking [2]
*Veterinary science [2½]		*Sewing [2]
Gymnasium [1]		

SECOND TERM

Civics or geometry [4]		
Plant propagation [3]		
Algebra [5] Optional		
Dressing and curing meats [1]	} or {	Meats [1]
*Stock judging [1]		Home economy [1]
Feeding [3]		*Cooking [3]
Soils and fertilizers [5]		Domestic chemistry [3]
*Veterinary science [2½]		Domestic hygiene [1]
		*Sewing [3]

ASSEMBLY

On each school day at 11:40 a. m. the students assemble in the chapel. After the opening exercises, brief talks are given by the principal, members of the faculty, or invited guests.

Members of the graduating class will, at this period, discuss the best books in literature and articles on public questions which appear in the leading magazines.

This plan gives to the students, in the course of the year, many things which will fit them to meet the demands of citizenship in the rural communities.

* Figures in brackets indicate the number of hours per week in which the subject is pursued. All work in subjects marked thus * extends through double time in the daily program.

COURSES OF INSTRUCTION

AGRICULTURAL BOTANY

This subject is taught with special reference to its bearing upon the everyday problems that present themselves to the farmer and gardener. It is profusely illustrated with flowers and plants from the greenhouses and nursery. Some instruction is given in the use of the compound microscope. Students are thus enabled to study intelligently, in an elementary way, the tissues of plants. By this means they get a clear idea of the general principles of plant structure and vegetable physiology.

AGRICULTURAL CHEMISTRY

In agricultural chemistry one term is given to the study of the elements and compounds which are of most importance in agriculture. This work is planned to prepare the student for intelligent study of the subject of the chemistry of foods, soils, and fertilizers, and at the same time to familiarize him with the more important chemical changes which take place in everyday life. Laboratory practice forms a prominent feature of the work in agricultural chemistry. In the chemistry of foods, the composition of plant and animal bodies, the chemistry of the plant and of its food and growth, the chemistry of animal nutrition, digestibility and value of foods, and the laws governing the economic uses of foods, are some of the subjects considered. The composition and the utilization of farm crops for food purposes, and the application of the principles of chemistry to plant and animal life form the basis of this work.

AGRICULTURAL PHYSICS

The general principles of the science are taught, special stress being laid upon those which to the greatest extent enter into the business of the farmer. About half the time is devoted to experimental work, which includes capillarity of soil; diffusion and osmosis of gases and liquids; heating, lighting, and ventilation; farm machinery in particular, pumps, eveners—especially three- and four-horse, pulleys, milk-testers, centrifugals, incubators, wind-mills, steam- and gasoline-engines; friction and lubricants; tensile strength of wire and binding twine of different grades; lightning and lightning protection. The foregoing indicates the character of the work, the attempt being to give the student an acquaintance with the laws of nature that he may act with reason and work to advantage.

AGRICULTURE

Soils; selecting and planning farms; subduing the fields; drainage; irrigation; fences; roads; buildings; water supply; groves; farm life and the relations of general science in agriculture.

Farm management: Remodeling farm plans; rotation of crops; manuring; production and management of farm manures, green manure crops, and the place of commercial fertilizers in field management in various parts of the state; farm administration, management of the fields in relation to fertility, to weeds, to yields, to live stock and to profits. Keeping weeds down by helpful crop rotations, careful field work, and good methods of farming generally; study of botany and habits of the various species of harmful weeds; methods of destroying each class of weeds.

ALGEBRA

Algebra is optional during the third year. This work covers Well's New Higher Algebra through simple equations. Special attention is given to literal notation, negative numbers, the equation and factoring.

BLACKSMITHING

The students are instructed in the management of the forge and fire, and in bending, shaping, and welding iron and steel. They are required to make links, rings, hooks, bolts, clevises, whiffletree-irons, tongs, cold-chisels, punches; in short, to become familiar with all the operations necessary to enable them to do their own repair work when they return to the farm. Particular attention is given to rapid and accurate welding and to the shaping and tempering of steel tools. The forges used are such as any farmer can make for himself, and each student is taught to make his own tools, so that he will be able to furnish his shop with very little outlay.

BREEDS OF HORSES

The aim in teaching this subject is to familiarize the students with the types of horses best representing the breeds adapted to the conditions that obtain in the state. Score cards are used, and standards of excellence made for comparative work.

BREEDING

Students receive instruction in the principles that govern breeding; on the influences that affect heredity and in the care and management of breeding stock. Pedigree receives careful consideration, and each student is required to make out pedigrees of two or more pure bred animals. They are also required to become familiar with methods of keeping live stock records of all kinds.

CARPENTRY

Instruction is given by means of lectures on the care and use of the common carpenter tools, such as should be found on every farm; also on methods of farm building construction, framing, laying out rafters, stairways, estimating building material, painting, etc. In the carpenter shop students are required to make such exercises as will give them some practice in using carpenter tools. They are required to make mortise joints, splices, drawing boards, hammer handles, eveners, cupboards, etc.

Each student is required to file his own saws, sharpen his planes, chisels, etc., and to lay out rafters for buildings.

CIVICS

During the last term of the course students receive instruction in this science, and graduate with a good understanding of the origin, necessity, nature and various forms of government, and the machinery employed to carry on public works, establish justice and provide for the common defense; of the organization and management of local institutions, the town, the village, the city, and the county; the manner in which states are created and the affairs administered; the three departments—legislative, judicial and executive—and the functions of each; the interdependence of the state and its citizens, as well as the powers and obligations of each, by due attention to which the state may be strengthened and the condition of its citizens ameliorated.

The relation of the state to the general government; the constitution and the powers it confers; and the provisions for amendments, are taught. The more important principles of commercial law, including contracts, agency, partnership, corporations, and commercial paper, receive attention. Instruction is also given in the United States method of surveying public lands.

COMPARATIVE PHYSIOLOGY

During the first year students take one term of applied physiology. This is an effort to connect technical physiology with the necessities of everyday life. The work includes a study of the general plan and structure of the body and the various individual tissues of which it is composed; also sources of heat and energy, digestion, and the relation of food materials to the various tissues of the body. Considerable attention is given to diseased and innutritious foods, food adulterations and narcotics. The circulation is studied with especial reference to the relation of the blood and lymph to tissue nutrition and tissue waste.

Accidents, including poisoning, are studied for the purpose of giving a practical knowledge of what to do in emergencies. Considerable attention is given to the subject of clothing, the various materials in use being considered with reference to fitness for special purposes. Some time is also given to the study of common physiology, of the organs of circulation, digestion, respiration, nervous system, and the relations of bacteria to the common diseases, especially such diseases as consumption, typhoid fever, etc. A brief study is also given to the subject of digestion in the lower animals.

The class work is illustrated by means of large charts, skeletons, manikins, and dissections. Important points of difference between human and animal physiology are pointed out in preparation for the third year's work in the veterinary class. Matters of home and personal hygiene are interwoven with the physiology work.

COOKING

The course in cooking extends through five terms of the curriculum as given below, with the subjects covered in each term:

(C) Second term—Kitchen management; care of cooking utensils and silverware; measuring and invoicing; cooking vegetables, cereals and breads.

(B) First term—Cooking meats, preserving fruits and vegetables.

(B) Second term—Eggs, beverages, soups, salads and table service.

(A) First term—Marketing and care of foods; dairy dishes, made over dishes, invalid cooking.

(A) Second term—Desserts, food rations, dietaries, confections, bills of fare and dining room.

DAIRY CHEMISTRY

The chemical and allied changes which take place in the handling of milk and its manufacture into butter and cheese, and the application of these principles to the production of milk and its products form the basis of this work.

DAIRY HUSBANDRY

Farm dairy lectures.—A course of lectures is given in farm dairying, giving instruction in the care of milk and utensils, explaining the principles involved in creaming milk by the gravity and centrifugal processes and giving full instruction in regard to running farm separators and the manufacture of butter and cheese in the farm dairy.

Dairy practice.—Students receive practical training in the most advanced methods of creaming milk, ripening cream, churning, working and packing butter, the manufacture of sweet curd cheese, and measuring the value of milk by the Babcock test and lactometer. This practice work begins the third week of the first term and continues through the school year.

Dairy stock.—During the last half of the first term students receive instruction in regard to characteristics of the various breeds of dairy cattle, their origin and comparative adaptability for the dairy. Lectures are given upon the points desirable in animals intended for the dairy. The students have practice work in judging dairy stock.

Feeding.—During the second term lectures are given covering both the scientific and practical phases underlying the principles of feeding. Practice work is given in compounding rations and estimating the comparative value of food stuffs.

DOMESTIC CHEMISTRY

The combination of human foods to form balanced rations, dietary studies of families, cost and value of foods, losses in the cooking and preparation of foods, cereal food products, animal food products, adulterations of foods and their detection, fuels, soaps, dye stuffs and colors, composition of common household utensils, the household water supply, preparation of home made baking powders, bakers' chemicals, composition, food value and characteristics of tea, coffee, chocolate, cocoa, molasses, honey, vinegar and spices, the grading and testing of wheat flour and the chemistry of bread making, form the essential parts of this work.

DOMESTIC HYGIENE

Several lectures by a physician will be given upon maidenhood, maternity and infancy. These special lectures will be supplemented by the regular lectures which consider the health of the family as dependent upon pure food, pure water, personal cleanliness and proper habits as well as upon heredity. The aim is to impress the truth that a knowledge of and obedience to the laws of hygiene are essential to the preservation as well as the restoration of health.

DRAWING

The student is taught the practical value of drawing for the purpose of designing and arranging buildings, machinery, etc. He makes drawings of the shop exercises, then works from his own drawings, thereby learning the application.

Designs are made for dwellings, barns, outbuildings, and machinery. As practical subjects for their designs students are requested to bring from home data for plans of buildings needed on their farms. Estimates are made of the amount of material required and cost of construction.

DRESSING AND CURING MEATS

The instruction given the boys consists of demonstration lectures on the preparation of meat for farm use. They are required in addition to take two weeks' practice in dressing, cutting, and curing such meat as is likely to be used on the farm. Work is also given them in selecting and judging fat stock, and in judging dressed meats.

ENGLISH

(C) The first year's work in English consists of almost daily practice in the simpler forms of composition. Applicants for admission to the C class should be familiar with the inflections of nouns, pronouns, and verbs, the definitions and classifications of phrases and clauses and the common case constructions.

(B) Once a week throughout the school year the members of the B class will prepare short essays, and submit them for criticism.

(A) At the option of the English Department a series of literary programs will be presented in chapel by the members of the graduating class. The numbers will include

abstracts of leading magazine articles, biographical sketches, book reviews, and selections from fiction; special prominence will be given to authors depicting American life.

ENTOMOLOGY AND ZOOLOGY

The class in entomology receives instruction of a practical nature. The course is divided as follows:

Classification of insects; habits and life histories of injurious forms with special attention to insect pests found in Minnesota. The nature of different insecticides and methods of application are discussed. The student spends some time in becoming acquainted with the appearance and habits of beneficial insects. Each student must collect fifty insects representing at least twenty-five different kinds.

FARM ACCOUNTS

The work in accounts is applied to the transactions which the student meets in the various duties on the farm. He is taught to keep his accounts, that he may know at any time the profit or loss of any department of his business, and is thus enabled to plan intelligently.

FARM ARITHMETIC

Instruction in this subject consists of the application of its principles to all kinds of farm problems, where measurements of material, extension, capacity, etc., are required. The student is prepared also to handle with ease the mathematics of the technical courses in the school.

FEEDING

The principles of feeding as applied to the production of horses, beef, cattle, sheep, and swine, are taught. Special attention is given to the choice and preparation of food for animals during different periods of growth and during the time they are used for breeding purposes and to summer feeding and pasturage. Practice is given in compounding rations that will include in the best manner the food stuffs commonly produced on the farm. Practical lessons in feeding are given at the barns under the supervision of an experienced feeder. Each student thus learns the requirements of each class of stock.

FIELD AGRICULTURE

Selected portions of agriculture and field crops for girls.

FIELD CROPS

Place in the rotation; preparation of the land; planting; cultivation; harvesting; storing and marketing of grains, field roots, fiber crops, sugar crops, grasses, clovers, and other forage crops; planting, care and use of pastures and meadows.

Laws of heredity and variation; possibility of increasing values; improvement and formation of varieties; general facts as to methods of breeding; specific plans of breeding leading field crops.

FORESTRY

Includes the consideration of the formation and care of wind breaks and shelter belts; the laying out and planting of home grounds; discussion of the hardiness, habits and value of our native and introduced trees; and the methods of propagating them.

FRUIT GROWING

Fruit growing is taught with reference to raising fruit for market and in the home garden.

GEOMETRY

Geometry is offered in the second term of the third year, as an elective in place of civics to those who wish to prepare for a college course. This work covers the first two books of Well's *Essentials of Plane Geometry*.

GYMNASIUM WORK

The gymnasium is a large, well-lighted, two-story brick building. It is well supplied with light and heavy apparatus for general gymnastic and athletic exercises, together with such appliances as are necessary for the development of a symmetrical body. Besides being fitted up with the finest apparatus, it possesses space and equipment for sprinting, pole-vaulting, hurdling, high and broad jumping, shot putting, etc.

Class work in physical training is required of all undergraduate young men not

excused on account of physical disability. Courses are offered on the heavy apparatus, in corrective work, class drills, and athletic training. In addition to the regular class drill, a certain part of which consists of training in athletic sports, the school is represented by a strong basket-ball team, a track athletic team, hand-ball team, and an indoor tennis team.

HANDLING GRAINS AND MACHINERY

Practical suggestions for the best methods of harvesting, shocking, stacking, and storing of cereal grains. Machinery, adaptation of the various kinds, with reference to the soil, weeds, season, etc.; adjustment with especial reference to durability, convenience in manipulation, etc.

HOME ECONOMY

The lectures are a study not only of the just proportion between expenditure and income, but of definite proportion in the expenditures made for existence, comfort, culture, and philanthropy. A study is made of the sources of income, especially of the income from the farm in the form of house, food, and luxuries; the purchase of clothing, household stores and furnishings is considered from the standpoint of the suitable. The relation of cash and credit to cost is also considered. Attention is given to savings and form of investment, a bank account and the use of a check book. Students are required to submit an account setting forth in detail the use of a certain named income expended in the support of a family for one year, embracing not only every item of necessary home expense, but also an outlay made for travel, luxuries, accident, sickness, or other emergencies. The habit of keeping a household account is calculated to strengthen the judgment in the wise use of money.

HOME MANAGEMENT

The subject includes both housekeeping and home-making, and the instruction is based on the belief that housekeeping is a business as important as it is difficult, and that home-making is the noblest form of human endeavor. The care of the house and household belongings, of the food and the clothing, as well as the ordering of family life are considered in their relation to an adequate plan for home management. To start the student in the right way of becoming mistress of the business of housekeeping and home-making is the end sought. The practical benefit to be derived from the knowledge students gain in the cookery, sewing, dairy, laundry, and other classes, is emphasized and shown in its relation to an adequate plan for the daily program for the home.

HOUSEHOLD ART

Lectures upon house and grounds, noting the distinctive character of the country home; the sanitary conditions involved in the selection of the site of the house; also the influence of the outlook; an elementary study of architecture in connection with planning a house which will provide "a place for everything" required in housekeeping operations and family life; instruction in the fundamental value of color, form and design in embodying beauty; training the taste and emphasizing the laws of hygiene that should influence the selection of materials and styles in the finishings and the furnishings of the house.

MEATS

The instruction given to the girls in the subject of meats pertains to the selection and value of different classes of meat, and to the best methods of curing and preserving.

LAUNDERING

In the first term of C year several lectures are given and practice work is provided in washing, ironing, starching, polishing, cleaning, and pressing clothing.

LIBRARY

The agricultural library now contains six thousand books and about six thousand pamphlets, including reports and bulletins. Aside from the large number of pamphlets and other publications of the different agricultural institutions and societies, a large number of the most important technical and agricultural magazines are kept on file, bringing together all the agricultural literature of any importance.

The librarian of the United States Department of Agriculture having inaugurated a system of co-operation with agricultural college and experiment station libraries, sent an assistant-librarian who spent two months reorganizing the agricultural library. Students and teachers can now readily find literature desired, in so far as it is collected in the library, and the thanks of the department are due to the secretary of agriculture for the valuable

aid given. Further co-operation with the Department of Agriculture and the Congressional Library is being arranged.

LITERARY SOCIETY WORK

Any student belonging to a recognized society of the school may receive credit in the course of study for the work done therein by registering at the beginning of the term, and submitting to the teacher in English all essays to be read by such student before the literary society and rehearsing to said instructor all essays, readings, or recitations with a view to correct pronunciation, expression, etc.

MILITARY DRILL

All male students of B and C classes, not physically unfit, are required to attend military drill. The students form an infantry battalion of four companies. Students are instructed practically in the schools of the soldier and company, extended order and military calisthenics, and theoretically in the schools of the soldier and company. Officers are selected from class A, non-commissioned officers from classes A and B.

The battalion is considered a part of the Corps Cadets of the University.

MUSIC

Instruction is given in this subject, not with the purpose of making trained musicians, but to introduce the students to the elementary principles of this art, and to develop in them a love for this most valuable factor in home and social life.

Illustrated lectures, in which music by the masters is used, are given at stated intervals.

PENMANSHIP

In penmanship the student is taught to write a plain hand with rapidity and ease. Daily drills are given using a free forearm movement.

PHYSICAL TRAINING

The work done in this department aims at symmetry, co-ordination and control rather than mere physical strength. It is planned to improve the functional activity of the body and to counteract and correct tendencies to incorrect development, especially those resulting from the artificial life of civilization. The work of the beginning class is free hand, based upon Swedish principles, and directed especially to deep breathing, correct carriage and posture. The work of the advanced class includes light apparatus æsthetic movements for suppleness in action and grace. Vigorous games are given to both classes.

PLANT PROPAGATION

In this subject the principles underlying the development of cultivated varieties of plants and seed testing are taught; also the propagation of plants by seed, cuttings, grafting, and budding. The work of the class-room is illustrated by the orchards, nurseries, forest plantations, gardens, and greenhouses on the grounds of the experiment station and by visits to commercial nurseries and greenhouses near by.

POULTRY

The instruction in this subject will include the following topics: History and characteristics of the leading breeds of poultry; breeding, feeding and management of fowls for eggs and for the market; planning, building, and arrangement of poultry houses; managing incubators and brooders. A model poultry house, containing pens of the most improved breeds, incubator cellar, workroom, etc., has been provided, where experimental work and practical instruction are carried on.

SEWING

The course in sewing consists of five terms' work. During the first term the student receives instruction in the elements of sewing, including different stitches, seams, hems, darning, etc., also practical talks on the use and care of all the implements belonging to the sewing basket. The second year's work consists of cutting and making plain garments, drafting of underwear, children's clothing, shirt waists and cotton dresses, taught by a very simple method, using only the tape line and square.

The third year the more difficult work of dressmaking is taken up; drafting patterns, cutting and fitting of dresses. Lectures are given on textiles, wearing and selection of materials. The study of harmony of color is given special attention. The course is designed to make each graduate capable of doing all kinds of sewing required in the home.

SOCIAL CULTURE

A course of lectures is given on the usages of society, including manners, behavior, the voice, conversation, forms of address, invitations, etc. Suggestions are made in reference to reading, literary taste, and the choice of books. Especial stress is given to the thought that the family life ought to be the highest expression of good society, and that next to the power of thinking correctly is the power of approaching others with ease and speaking with tactful directness.

SOILS AND FERTILIZERS

The composition of soils, and their properties, the sources of plant food, the kinds and amounts of food required by crops and the best ways of supplying these demands, the various forms in which plant food exists in the soil, farm manures, their uses and action upon the soil, the income and outgo of fertility from the farm, soil exhaustion and soil improvement, the rotation of crops, as based upon the chemistry of soils and the principles governing the conservation of the fertility of the soil form the more important features of this subject.

STOCK JUDGING

Score cards are used to an extent sufficient to familiarize students with that method of judging, and special efforts are made to do systematic and closely critical work in the selection of animals representative of the breeds and for breeding purposes. Living specimens are used and rings will be made up for the student contests in stock judging. In connection with the work in dressing and curing meats, the judgment passed on live animals for the block is verified by score cards, judgment of the dressed carcasses and by actual block tests. These tests are made by the students and bring out the percentage of meat in each commercial cut of the carcass. The quality of meat is passed upon in this connection by experts, and a careful report made to ascertain the type of animals best calculated for the production of the most meat of the best quality.

STUDY OF BREEDS

This work covers a discussion of characteristics of the leading pedigreed breeds of beef cattle, sheep and swine adapted to northwestern conditions; the environments to which each breed is especially suited; and practice in the selection of animals that are representative of the various breeds.

VEGETABLE GARDENING

Vegetable gardening embraces the study of garden tillage, irrigation, and rotation of crops; transplanting; formation and care of hotbeds; study of garden insects; and the growth of various vegetable crops.

VETERINARY SCIENCE

During the A year the student takes up a course of study in veterinary medicine, the purpose of which is to fit him for intelligent care of his farm stock. In this course the teaching is done by means of lectures, distribution of mimeographed lecture notes after each lecture, reviews and clinical work at the hospital maintained for this purpose. Lectures are illustrated by means of charts, manikin of horse, skeleton of horse, and various other appliances.

The lectures consist of a series on each of the following subjects: Elementary anatomy; elementary pathology; cause and prevention of diseases; diagnosis and treatment of common diseases, examination for soundness, and a final short course on common medicines, studying their effects, uses and doses. At the hospital clinics students are enabled to examine and care for a variety of cases and to learn the elements of diagnosis for the more common diseases and forms of lameness.

APPENDIX C

PREPARED BY W. M. HAYS, BY REQUEST OF THE COMMITTEE
INDUSTRIAL COURSE IN THE CONSOLIDATED RURAL SCHOOL, THE
AGRICULTURAL HIGH SCHOOL AND THE AGRICULTURAL COL-
LEGE ARTICULATED INTO A UNIFIED SCHEME

The articulation of studies in agriculture and in home economics or, as it is more often called, domestic economy, thru the consolidated rural school, the agricultural high school, and the agricultural college, heretofore has not been attempted. To demonstrate

that this is practicable, and to frame a basic attempt from which the several school faculties may work in articulating schools of the three classes named, the outlines below are presented. These include also the studies not relating to agriculture or home economics, that some idea of proportions as well as of placement and gradation may be shown. The published course of study for the rural schools of Wisconsin, the course of study for the Minnesota Agricultural High School and the collegiate agricultural course of the University of Minnesota were used as the basis of this outline, with additions, omissions, and changes to suit. While the articulation was kept prominently in mind, the plan was pursued of giving in each lower grade those practical things which promise to be especially valuable to the pupil who drops out. It is hoped that this outline will also be an aid to those who are responsible for the courses of study in rural schools of smaller unit and those interested in formulating courses of study in agricultural high schools smaller than the Minnesota Agricultural School, after which the high-school course of this scheme is modeled.

That these three schools designed to educate for country life can be articulated, as the city graded schools, the city high school (including the city mechanics arts high school) and general and technical courses of the state university, or other college, designed for city life are articulated, is made evident by this outline. It will be seen that this scheme will also enable pupils to transfer from country school to city school, or vice versa, up to the end of the second high-school year without great loss, thus better unifying all schools, of country and town.

It is proving no more difficult to grade the instruction in agriculture and in home economics in primary, secondary, and collegiate courses of study than it was to distribute work in English or history thruout these three classes of schools; tho as yet, owing to the newness of these subjects, the process has not proceeded so far in the former as in the latter. In blocking out this scheme of nature study, agriculture, manual training and home economics for country youth, it is understood that any given school must adapt it, to its own conditions, giving such parts suited to its own grades as its surroundings, equipment and teaching force may render practicable, arranging for articulation with other schools where possible. Thus the teacher in the one-room rural school might be able to take up a few of the nature-study courses designated for the first five grades and some of the courses in agriculture and home economics, outlined for the sixth, seventh, and eighth years. The teachers in the two- or three-room rural school could give still more of this work; and those pupils who are able to attend the agricultural high school would thus be better prepared there to take the advanced work provided in science, manual training, agriculture and home economics.

The consolidated rural school provided with a teacher qualified in agriculture and a teacher trained to instruct in home economics, and two or more teachers to assist in the general instruction, could care for the entire ten grades. Even here, however, the course as outlined would necessarily need to be modified to suit local needs, equipment, and preparation of the teaching force.

Books and other helps on nature study, agriculture and home economics for use in these variously organized rural schools and following the general scheme outlined, could be provided by makers of publications and apparatus, and could be fitted into the respective grades by any school organization using them.

The agricultural high-school course cannot be at once completely reorganized in county agricultural high schools or even in large agricultural high schools in state districts of larger size. Each school will be compelled to receive pupils with various stages of preparation in the general school subjects and often with no school instruction in agricultural and home economics subjects, tho usually with more or less careful home training and experience in these practical lines; and it has been found that a large percentage of those who enter with but poor preparation become strong students and continue to gradua-

tion. On the other hand, local conditions, as the short time the pupils will remain in the agricultural high school and the limitations in the way of equipment and teaching force, will make it quite impossible to secure uniformity in requirements for graduation. In time it may be possible to approximate the uniformity reached in this respect in city high schools, tho such uniformity is by no means a matter of prime importance. The main thing sought should be to give more training to all, however early or late in the course they may drop out of school. The course below is given only as a sort of guide and a standard which all such schools may strive to reach. Where a state can organize consolidated rural schools fully developed according to the general plan given, it is believed that the agricultural high school may be given its definite portion of school work much as outlined, and that the agricultural collegiate course will develop strongly and naturally beside other collegiate and university courses. Making practical education universal in the lower schools is the real problem, and the chief function of the higher schools is to make possible some technical education in the lower schools where all pupils may receive some benefit.

The courses in agriculture, forestry and home economics in agricultural colleges are gradually approaching a uniform standard, with requirements in amount similar to those established for entrance into the undergraduate course in universities. The desire to rank with other institutions is, however, of less importance to the state than that the college shall prepare teachers for lower schools, leaders in the industry of agriculture and in home-making, and investigators and advanced teachers. Since studies in these technical branches are rapidly rising in value as means of education or culture, in addition to their technical value, agricultural college courses promise to hold a position beside the general courses, if indeed, they shall not be ranked as broader because they both educate and prepare for definite work.

CONSOLIDATED RURAL SCHOOL COURSE

FIRST YEAR

Reading.	Writing.
Spelling.	Music.
Language.	Nature study.
Number work.	General exercises.

SECOND YEAR

Reading; using in part themes from nature, the farm, and the home.	Music.
Spelling.	Hygiene.
Language.	History.
Number work.	Drawing.
Writing.	Nature study.
	General exercises.

THIRD YEAR

Reading; nature stories forming a part.	Geography.
Spelling.	Hygiene.
Language.	History.
Arithmetic.	Nature study.
Writing.	General exercises.
Music.	

FOURTH YEAR

Reading; country life literature included.	Geography; should include the distribu- tion of farm products.
Spelling.	Hygiene.
Language.	Drawing.
Arithmetic.	Nature study.
Writing.	General exercises.
Music.	

FIFTH YEAR

Reading; including stories of our country and lessons in agriculture and home economics.

Spelling.
Language.
Arithmetic.
Writing.
Music.
Drawing.

Geography; including in part physical geography in respect to the work done by nature's forces in preparing soils.

History.
Physiology.
Nature study.
General exercises.
Literary society work.

SIXTH YEAR

Reading; lessons should include animal life and adventure.

Spelling.
Language.
Arithmetic.
Writing.
Music.
Drawing.
Geography.
Physiology.

History.

Drawing.

Physiology; including principles of nutrition and food values.

Co-operative enterprises.

Agriculture; 1st half-year, the affairs of agriculture; 2d half-year, the soil.

General exercises; for boys, wood work; for girls, sewing.

Literary society work.

SEVENTH YEAR

Reading and literature.

Spelling.

Grammar.

Arithmetic.

Writing.

Geography; combined with physical geography.

Music.

History.

Co-operative enterprises.

Agriculture; farming schemes and crops.

General exercises.

Literary society work.

EIGHTH YEAR

Reading and literature.

Spelling.

Grammar.

Arithmetic; including farm problems, land surveying and farm statistics.

Music.

Geography.

History.

Agriculture; animals-practice work.

General exercises.

Literary society work.

Ninth and Tenth, or First Two High School Years are Placed in the Consolidated Rural School

NINTH YEAR (D HIGH SCHOOL YEAR): FIRST HALF-YEAR

Agricultural botany.....(4)

Elementary algebra.....(5)

English.....(4)

Drawing—farms and buildings.....(2)

Rhetoricals.....(1)

Boys

Rural engineering.....(3)

Girls

Sewing.....(2)

Agriculture.....(1)

SECOND HALF-YEAR

Agricultural botany.....(4)

Elementary algebra.....(5)

English.....(4)

Farm accounts.....(4)

Rhetoricals.....(1)

Boys

Fences and farm conveniences.....(2)

Girls

Cooking.....(2)

TENTH YEAR (C HIGH SCHOOL YEAR): FIRST HALF-YEAR

Plane geometry.....	(5)		
Physiology—foods and feeds.....	(4)		
Civics.....	(4)		
General history.....	(5)		
Rhetoricals.....	(1)		
<i>Boys</i>		<i>Girls</i>	
Judging stock and seeds.....	(1)	Sewing.....	(2)
Carpentry.....	(2½)		

SECOND HALF-YEAR

Plane geometry.....	(5)		
English.....	(4)		
Agricultural mathematics.....	(4)		
General history.....	(5)		
Rhetoricals.....	(1)		
<i>Boys</i>		<i>Girls</i>	
Judging stock and seeds.....	(1)	Sewing.....	(2)
Carpentry.....	(2½)		

* AGRICULTURAL HIGH SCHOOL

ELEVENTH YEAR (B YEAR): FIRST HALF-YEAR

Fruit growing.....	(3)		
Higher algebra.....	(5)		
Agricultural physics.....	(4)		
Drawing.....	(1)		
Poultry.....	(2)		
Dairy husbandry.....	(2)		
<i>Boys</i>		<i>Girls</i>	
Carpentry.....	(2)	Social culture.....	(1)
Military drill.....	(2)	Laundrying.....	(2)
Gymnasium.....	(1)	Physical culture.....	(2)

SECOND HALF-YEAR

Solid geometry.....	(5)		
Elementary chemistry.....	(5)		
Agricultural physics.....	(5)		
Dairy husbandry.....	(2½)		
<i>Boys</i>		<i>Girls</i>	
Drawing barns.....	(2)	Home management.....	(1)
Study of breeds.....	(2)	Drawing farm houses.....	(1)
Military drill.....	(2)	Sewing.....	(2)
Gymnasium.....	(1)	Physical culture.....	(2)

TWELFTH YEAR (A YEAR): FIRST HALF-YEAR

Chemistry of plants and animals.....	(5)		
Forestry.....	(3)		
Entomology and Zoölogy.....	(5)		
Dairy chemistry.....	(2)		
<i>Boys</i>		<i>Girls</i>	
Breeding animals.....	(2)	Cooking.....	(2)
Veterinary.....	(2½)	Household art.....	(1)
Blacksmithing.....	(2½)	Sewing.....	(2)
Military drill.....	(2)	Physical culture.....	(2)
Gymnasium.....	(1)		

SECOND HALF-YEAR

Plant propagation.....	(3)
Farm management.....	(2)

Boys	Girls
Breeding crops.....(1)	Meats.....(1)
Field crops.....(2)	English.....(4)
Dressing and curing meats.....(1)	Pedagogy.....(4)
Feeding animals.....(3)	Cooking.....(3)
Soils and fertilizers.....(5)	Sewing.....(3)
Veterinary.....(2½)	Home economy.....(1)
Blacksmithing.....(2½)	Dietary studies.....(3)
Military drill.....(2)	Domestic hygiene.....(1)
Gymnasium.....(1)	

The outline below is made somewhat elective, the specific statements following show what is included in each of the subjects from among which the student may elect:

FRESHMAN YEAR

A. Required for Graduates of Agricultural High Schools

FIRST SEMESTER	SECOND SEMESTER
Mathematics.....(4)	Mathematics.....(4)
Drawing.....(4)	Chemistry.....(2)
Botany.....(4)	German, French or Spanish.....(4)
German, French or Spanish.....(4)	Botany.....(4)
Military drill or Gymnasium.....(2)	Military drill or Gymnasium.....(2)
	English literature.....(2)

NOTE.—A modern language elected must be pursued for the full two years.

B. Graduates of City High Schools take in lieu of the above freshman course a full year of prescribed technical work in agriculture or home economics in an approved agricultural high school, choosing technical subjects as from the agricultural high-school course given above.

SOPHOMORE YEAR

FIRST SEMESTER	SECOND SEMESTER
Rhetoric.....(3)	Geology.....(3)
<i>Agricultural chemistry</i>(4)	Zoölogy.....(3)
German, French or Spanish.....(3)	<i>Agricultural chemistry</i>(4)
<i>Agricultural physics</i>(2)	German, French, or Spanish.....(3)
Military drill or Gymnasium.....(2)	<i>Agricultural Physics</i>(2)
Zoölogy.....(3)	Rhetoric.....(1)
	Military drill or Gymnasium.....(1)

JUNIOR YEAR

FIRST SEMESTER	SECOND SEMESTER
English.....(3)	<i>Agricultural economics</i>(3)
Elective, academic.....(3)	Elective, academic.....(3)
Elective, academic.....(3)	Elective, academic.....(3)
Elective technic, major.....(4)	Elective technic, major.....(4)
Elective technic, minor.....(4)	Elective technic, minor.....(4)

SENIOR YEAR

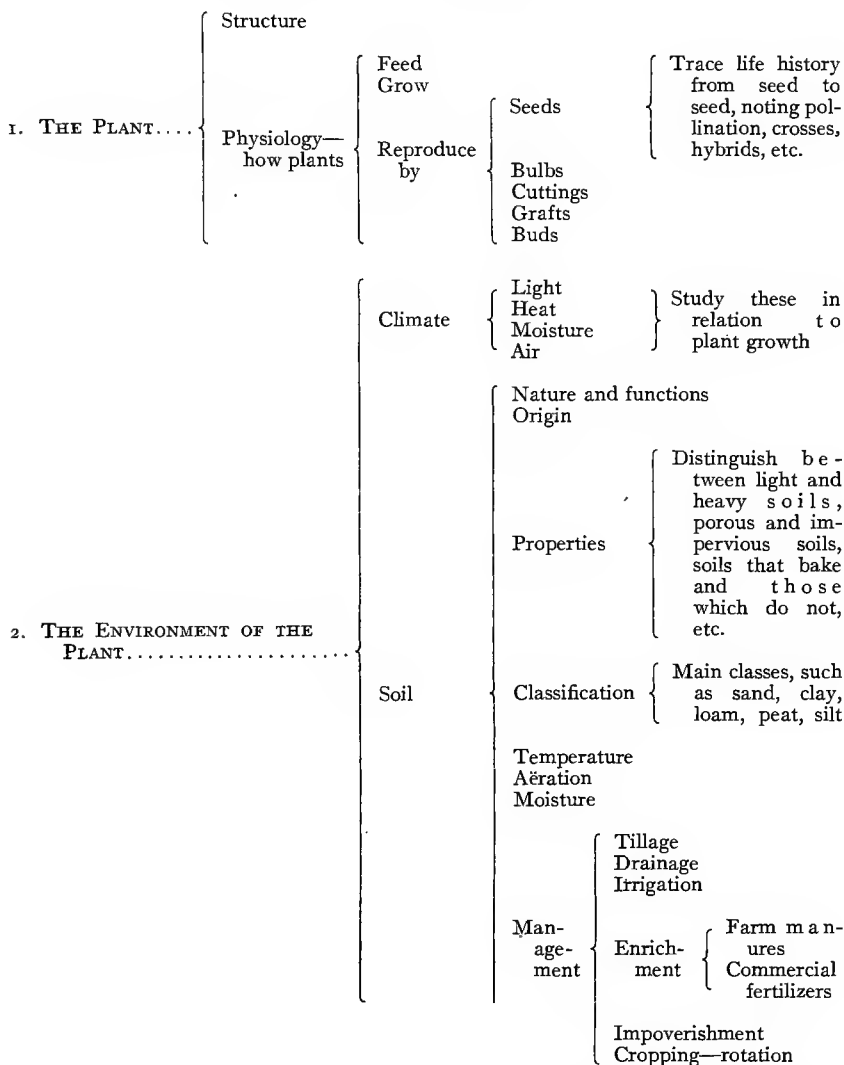
FIRST SEMESTER	SECOND SEMESTER
Elective, academic.....(3)	Elective, academic.....(3)
Elective, academic.....(3)	Elective, academic.....(3)
Elective, academic.....(3)	Elective, academic.....(3)
Elective technic, major.....(4)	Elective technic, major.....(4)
Elective technic, minor.....(4)	Elective technic, minor.....(4)

NOTE.—The figures in brackets indicate the number of weekly recitations of the respective studies. Minor agricultural subjects cover not more than two semesters work in the junior and senior years. The major agricultural work subjects, including a graduating thesis and a year of practical work, is to be carried through the junior and senior years.

APPENDIX D*

SYLLABUS OF ELEMENTARY COURSE IN AGRICULTURE**

I. PLANT PRODUCTION



*From Circular No. 60, issued by United States Department of Agriculture, December, 1904; published by permission of the United States Department of Agriculture.

**In this syllabus the same general arrangement of topics has been made as in the higher courses outlined by this committee, but it is of course to be understood that the treatment of these topics by the teacher in the common school should be brief, simple, and elementary.

3. FARM CROPS.....
- | | | | | | |
|--|--|--|---|--|--|
| { | Classification | { Include only the most general classes, such as cereals, grasses, legumes, tubers, etc. | | | |
| | Individual crops.
(Study one or more of the leading crops of the region.) | { Name
Place in classification
Varieties | | | |
| | | Culture | <table border="0"> <tr> <td>{ Preparation of soil
Selection of seed
Testing of Seed
Planting
Cultivating</td> <td rowspan="3">{ Weeds
Diseases
Insects
Birds
Mammals</td> </tr> <tr> <td>{ Protection from pests</td> </tr> <tr> <td>{ Harvesting
Marketing</td> </tr> </table> | { Preparation of soil
Selection of seed
Testing of Seed
Planting
Cultivating | { Weeds
Diseases
Insects
Birds
Mammals |
| { Preparation of soil
Selection of seed
Testing of Seed
Planting
Cultivating | { Weeds
Diseases
Insects
Birds
Mammals | | | | |
| { Protection from pests | | | | | |
| { Harvesting
Marketing | | | | | |
4. FRUITS..... { One or more of the leading fruits of the region should be studied in the same manner as farm crops.

II. ANIMAL PRODUCTION

1. DOMESTIC ANIMALS—THEIR TYPES AND BREEDS.....
- | | | | |
|---|--------------------------|--|---|
| { | Horses | { Draft
Trotting
Roadsters, etc. | { Bring out leading characteristics of one or two leading breeds of each type represented in a given region |
| | Cattle | { Dairy
Beef | |
| | Sheep | { Wool
Mutton | |
| | Swine
Poultry
Bees | | |
2. CARE AND MANAGEMENT OF DOMESTIC ANIMALS.....
- | | | | | | | |
|---|--|---------|---|--|---|--|
| { | { | Feeding | { Only the most general statements regarding the food requirements of different animals and for different purposes, and exercises in compounding rations suitable to a given region | | | |
| | | Hygiene | <table border="0"> <tr> <td>{ Water supply
Exercise
Shade
Condition of inclosures as to</td> <td rowspan="2">{ Comfort
Ventilation
Cleanliness</td> </tr> <tr> <td></td> </tr> </table> | { Water supply
Exercise
Shade
Condition of inclosures as to | { Comfort
Ventilation
Cleanliness | |
| | | | { Water supply
Exercise
Shade
Condition of inclosures as to | { Comfort
Ventilation
Cleanliness | | |
| | | | | | | |
| | { Preparation and care of product
Marketing product | | | | | |

III. DAIRYING

1. THE DAIRY COW....
- | | | |
|---|---------------------------------|---|
| { | Type | { A more detailed study of the dairy type than was given under animal production. |
| | { Feeding, care, and management | |

2. MILK....	Composition	{	How determined Relation to price		
	Handling	{	Cleanliness	{	Stables Cows Attendants Vessels
			Straining Aërating Cooling		
	Uses	{	For consumption as milk or cream	{	Putting up in cans or bottles. Marketing
			For condensing	{	Putting in cans and hauling
			For cheese making		
			For butter making	Creaming	{ By setting in pans By use of separator
				Churning	{ Temperature Kinds of churns
				Salting Coloring Working Packing Marketing	

IV. RURAL ENGINEERING

It is not thought that the pupils in a rural common school will be prepared to study the problems involved in rural engineering from the view point of the engineer, but it is hoped that there will be some opportunity to examine the plans and structure of good types of buildings, fences, roads, etc., and to devote some time to drawing simple plans of farms, buildings, and other works. The importance of good roads, hygienic water supply and sewage disposal, and of caring for farm machinery should be emphasized.

1. FARM PLANS.....	{	Size and location of fields Location of buildings, fences, drains, and roads
	{	Buildings { House Barn Outbuildings Fences
2. CONSTRUCTION OF BUILDINGS AND WORKS.	{	Water system Sewage system Roads
	{	Irrigating system { Only in regions where irrigation is practiced
3. FARM MACHINERY.....	{	Interesting facts regarding the development of farm machinery in a way to encourage the more general use of improved machinery The importance of caring for and repairing farm machinery

V. RURAL ECONOMICS

Most of the topics under rural economics are too broad to be included in a brief course in agriculture, or too complex for the comprehension of common school pupils. It is thought, however, that some of the general principles of marketing and farm accounts

might be taught in this connection. The main factors in marketing will probably be best considered in connection with the disposal of particular products as indicated above under plant production, animal production, and dairying. The following topics are appropriate for this course:

- | | | | |
|-----------------------|---|---|---|
| 1. MARKETING..... | { | Preparation for market
Choice of market
Transportation
Method and cost of sale | |
| 2. FARM ACCOUNTS. ... | { | Feed and milk records
Crop records
Breeding records
Inventories
Bookkeeping | } |
- This is to include only the most general suggestions and a discussion of the importance of keeping full and accurate records

A. C. TRUE,
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T. F. HUNT,
H. T. FRENCH,
J. F. DUGGAR,

*Committee of the Association of American Agricultural Colleges
and Experiment Stations.*

